A·I·B·S

bulletin

NEWS AND VIEWS IN THE BIOLOGICAL SCIENCES

Vol. V APRIL • 1955 No. 2

A Survey of Biological Abstracting ..... *Bentley Glass* 18

John Simon Guggenheim Memorial Foundation 23

Who Will Teach Our Future Scientists? . . *J. Kenneth Donahue* 24

Jackson Hole Biological Research Station ..... *L. Floyd Clarke* 27

Oceanographic Institute of Florida State University
Samuel L. Meyer and R. H. Williams 28

Duke University Marine Laboratory ..... *Cazlyn G. Bookhout* 30

Laboratory of Hydrobiology, University of Wisconsin
Arthur D. Hasler 31

Hopkins Marine Laboratory ..... *L. R. Blinks* 33

Know Your Associates 34

Across the Editor's Desk 9

The AIBS Reports 12

From the Societies 12

Letters to the Editor 12

The Biology Library 13

Advanced Registration Form for East Lansing Meetings 25

Graph of Biological Societies' Membership and Dues 26

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SPECIAL NOTICE ABOUT A.I.B.S.

In September 1954 the Member Societies of AIBS voted to have the Institute become independent of the National Research Council, under which it has functioned since it was formed in 1948.

In January 1955 the Institute became incorporated in the District of Columbia as a non-profit, national organization of professional biological societies and biologists.

New office space was located at 2000 P Street, N.W. (Washington 6, D.C.) and the staff moved March 17th. These offices are on the 5th floor of a newly-remodelled building just off Dupont Circle in downtown Washington. The officers and staff invite any member of AIBS who is in the city to visit these new quarters.

Dr. Hiden T. Cox, Deputy Director of AIBS for a year (1953-54) has agreed to return on a permanent basis as Director of the Institute. He will take office July 1, 1955. In the interim period Dr. Bentley Glass, President, and Dr. Raymund Zwemer, Secretary-Treasurer, have been directing the activities of AIBS.

Across the Editor's Desk

• **A new marine biological station, the Cape Haze Marine Laboratory, was opened recently at Placida, Florida.** Situated on Gasparilla Sound, it offers opportunities for studying the fauna and flora of the Gulf of Mexico and will be open to independent investigators and graduate students in the near future. The laboratory is the first part of a cultural center planned for Cape Haze, a development sponsored by William H. Vanderbilt and Alfred G. Vanderbilt. A museum of local fishes has been started and facilities for keeping living fish are under construction. Dr. Eugenie Clark is Director of the Laboratory.

• **The 8th annual summer conference sponsored by the Biology Department of the Brookhaven National Laboratory,** Upton, N. Y., will take place June 15-17, 1955. The program on the subject of *Mutation,* includes the following speakers and topics: S. Benzer, Genetic Fine Structure and its Relation to the DNA Molecule; A. D. Hershey, The Chemical Organization of Virus Genetic Material; J. G. Gall, The Ultrastructure of Chromosomes; A. W. Ravin, The Properties of Bacterial Transforming Systems; G. Bertani, The Role of Phage in Bacterial Heredity; B. McClintock, Intranuclear Systems Controlling Gene Action and Mutation; M. Demerec and Z. Demerec, Factors Determining the Effectiveness of Certain Mutagens; H. B. Newcombe, The Timing of the Induced Mutation Process in *Streptomyces* Spores; N. H. Giles, Jr., Forward and Back Mutation at Specific Loci in *Neurospora;* H. J. Muller, The Relation between Chromosome Changes and Gene Mutation; J. S. Kirby-Smith, Effects on the Genetic Material due to Radiations of Different Linear Energy Transfer; H. B. Glass, Properties of Genetic Material Manifested by Changed Mutability during Different States of Gametogenesis; W. L. Russell, The Mutational Characteristics of Specific Loci; W. S. Stone, Indirect Effects of Radiation on Genetic Material; W. K. Baker, The Oxygen Effect and the Mutation Process; and A. Novick, Mutagens and Antimutagens. Chairmen will be K. G. Stern, R. D. Hotchkiss, A. Srb, A. H. Sparrow, K. Sax and W. R. Singleton.

Those planning to attend should notify *Dr. R. C. King, Brookhaven National Laboratory,* by May 21, 1955. Non-citizens of the United States should indicate their nationality when writing.

• **An Institute of Biology for teachers of college biology will be held at the University of Wyoming,** July 18 to August 19, 1955. The National Science Foundation is sponsoring the Institute through a grant of $15,000. which will include 25 stipends in the amount of $250 each, for college teachers. Applications should be sent to the *Director, William G. Owen, Department of Zoology, University of Wyoming.* The Associate Director will be Harry V. Truman, Department of Biology, Denison University. The Institute program will feature guest lecturers, discussions and conferences on (1) teaching general biology, (2) teaching upper division courses, (3) training of a college biology teacher, and (4) field methods in biology. Emphasis will also be placed on laboratory demonstrations and the display of material and equipment. Two weeks of the Institute will be conducted at the University of Wyoming Science Camp in the Medicine Bow Mountains, where field exercises will be stressed.

• **The University of Florida, North Carolina State College, Virginia Polytechnic Institute and the Southern Regional Education Board are jointly sponsoring a series of cooperative summer sessions in statistics.** The first of these was held during the summer of 1954 at Virginia Polytechnic Institute. The second session will be held at the University of Florida from June 20 to July 29, 1955. Each session lasts six weeks and carries approximately 3 semester hours of graduate credit. The faculty for the 1955 session will include: R. L. Anderson, N.C.S.C.; D. B. Duncan, U. of Fla.; Boyd Harshbarger, V.P.I.; Carl E. Marshall, Okla. A & M; Herbert A. Meyer, U. of Fla.; George E. Nicholson, Jr., U. of N.C.; Phillip J. Rulon, Harvard University; Walther L. Smith, U. of N.C.; and Dudley E. South, U. of Fla.

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• **The Biological Laboratory, Cold Spring Harbor, is offering two specialized summer courses,** designed to acquaint research workers with the most important techniques used in bacterial virus research and bacterial genetics. The course on *Bacterial Viruses* will be held from June 20 to July 9, 1955 and *Bacterial Genetics* will be conducted from July 13 to

August 2, 1955. A limited number of the fellowships, covering part of the tuition fees, are available for graduate students. In addition, research facilities for work in microbial genetics will be available throughout the summer to a limited number of independent research workers. Information may be obtained from the Biological Laboratory, Cold Spring Harbor, New York.

• **The Golden Anniversary of the U. S. Forest Service** was celebrated in February at a national dinner, held in Washington, D. C. and sponsored by the American Forestry Association, a citizens' organization of 25,000 members, and the Society of American Foresters, an organization of 10,000 professional foresters. The Forest Service was created in 1905, during the administration of President Theodore Roosevelt, with Gifford Pinchot as the first Chief Forester.

• **The Second International Seaweed Symposium** will be held July 13-17, at the Norwegian Technical University, Trondheim, Norway. Correspondence relating to the Symposium should be addressed to: *2nd International Seaweed Symposium, c/o Professor T. Braarud, Blindern, Oslo, Norway.*

• **The Rockefeller Foundation has given the University of California one million dollars for the support of research in marine biology at the University's Scripps Institution of Oceanography, La Jolla, Calif.** The grant will be used over an eight-year period to strengthen present research projects and initiate new ones. A visiting professorship and four resident professorships will be established, in addition to several graduate fellowships and post-doctoral fellowships.

• **The 10th annual Indiana Conservation Education Camp for teachers** will be held at Versailles State Park, Versailles, Ind., June 13 to July 23, 1955. The camp is administered by Purdue University and is sponsored jointly by the Indiana Dept. of Conservation, the State Office of Public Instruction and Purdue. The camp offers two consecutive field courses of three weeks each. Three semester hours of upper division credit will be granted for each three weeks period. Cost, including fees, meals, lodging and instruction, is $52.50 for three weeks and $105.00 for six weeks. Non-resident students will be charged an additional fee of $17.50 for each three weeks session. Further information may be obtained by writing to *Howard H. Michaud, Dept. of Forestry, Purdue University, Lafayette, Ind.*

• **The Dept. of Zoology, Duke University, invites applications for the Charles W. Hargitt Fellowship in Zoology.** The fellowship is awarded at the post-doctoral level in support of full-time research in cellular studies. The stipend varies with the qualifications and needs of the recipient, but is ordinarily $4000-$5000. The recipient has no departmental duties. Work may be done at Duke University and/or at the Duke Marine Laboratory. Inquiries and applications should be addressed to *Dr. H. S. Roberts, Dept. of Zoology, Duke University, Durham, N.C.*

• **Research proposals directed to the Division of Biological and Medical Sciences of the National Science Foundation will be received at any time.** The proposals on research projects to begin during the latter half of the academic year 1955-56 will be reviewed during October 1955. These proposals should be received by the Foundation prior to September 15, 1955.

• Under a grant made by the National Science Foundation, **funds will be available for research in the biological sciences at the Mountain Lake Biological Station** during the summer, June 16 to August 24, 1955. Those interested should write to the *Director, Mountain Lake Biological Station, Biology Building, University of Virginia, Charlottesville, Va.*, immediately for application blanks and instructions. Deadline for applications is April 15, 1955.

• **The National Council to Combat Blindness, Inc., has announced that it will welcome applications for its 1955-56 research awards** for grants-in-aid and fulltime research fellowships in the field of sight, both normal and pathological, including the various branches of biological, chemical and physical sciences. Applications will be considered in May and the closing date for receipt of applications is April 15, 1955. Appropriate forms may be obtained from: *Secretary, National Council to Combat Blindness, Inc., 30 Central Park South, New York 19, N.Y.*

• **The Carver Foundation of Tuskegee Institute has announced the availability of fellowships** for research and graduate study toward a Master of Science degree in chemistry, foods and nutrition, agronomy, and poultry science. Stipends range from $1200 to $1500 annually. Fellows normally devote half time to supervised research and half to graduate study. In addition to the areas specified above, opportunities for research are provided in bacteriology and plant physiology. Further information and applications may be obtained from: *Director, The Carver Foundation, Box 188, Tuskegee Institute, Alabama.*

• **A two-week Workshop on the Use of Radioisotopes in High School Science Teaching will be held at Iowa State Teachers College,** Cedar Falls, Iowa, June 13-25, 1955. It will be conducted under the direction of the Science Dept. of the College with the technical assistance of the Atomic Energy Commission. The workshop is planned with the idea that the use of radioisotopes for this purpose is both practical and safe. Enrollment is restricted to 24 participants. A grant from the Standard Oil Foundation, Inc., has made possible the offering of 20 scholarships. Inquiries should be addressed to: *J. W. Kercheval, Science Dept., Iowa State Teachers College, Cedar Falls, Iowa.*

• **The National Association of Science Writers has asked the Survey Research Center of the University of Michigan to begin finding out how Americans react to science news.** The science writers would like to know how good a job they are doing in reporting scientific developments, who reads, hears or sees science news, who avoids it, which areas of science do most people want to hear about and which they reject. The pilot study is being financed by the Rockefeller Foundation.

• **The Animal Welfare Institute is inaugurating the annual award of a bronze medal, to be known as the Dr. Albert Schweitzer medal,** and $500, in recognition of "an outstanding contribution by a research scientist to the reduction of laboratory animal suffering." Nominations for possible recipients of the medal may be sent to the offices of the *Institute, 350 Fifth Avenue, New York 1, N.Y.*

• **Oscar Riddle,** discoverer of the pituitary hormone, prolactin, has been awarded the $100 First Prize of the Thomas Paine Foundation and a $500 prize for the "Best Vantage Book of the year" for his new book, "The Unleashing of Evolutionary Thought".

• In September 1954 the officers of **Nature Conservancy** learned that logging crews were ready to move into the last cypress forest of southwest Florida, known as Corkscrew Swamp. In collaboration with the National Audubon Society, the $145,000 necessary to stop the lumbering was raised through individuals, contributions and foundations. However, the underwriting was obtained with the understanding that Nature Conservancy would carry on a campaign to raise at least $25,000 of the amount. Contributions will be gratefully received now from anyone who wants to share in the preservation of this unique area.

• **A new journal, *Virology*, will appear shortly** from Academic Press Inc., Publishers, 125 East 23rd St., New York 10, N.Y. Volume I, No. 1 is scheduled for release in May. One volume per year is planned. Subscription price is $9.00. The Editorial Board is composed of: George K. Hirst (Editor-in-Chief), L. M. Black, S. E. Luria, (Editors), C. H. Andrewes, C. A. Brandly, Seymour S. Cohen, A. H. Doermann, J. F. Enders, C. A. Evans, Werner Henle, A. D. Hershey, F. O. Holmes, F. L. Horsfall, Jr., Hilary Koprowski, Andre Lwoff, J. W. Moulder, G. S. Pound, T. T. Puck, A. F. Ross, H. K. Schachman, E. A. Steinhaus, R. C. Williams, and C. E. Yarwood (Associate Editors).

• **Cornell University will use a du Pont grant to stimulate better science teaching in high schools through fellowships** to encourage science students to enter science teaching and to help science teachers to take advanced study. One group of fellowships will give full tuition and $1200 towards expenses to science majors from liberal arts colleges who plan to spend 1955-56 at Cornell in courses leading to full certification for secondary school teaching and a master's degree. A second group will cover full tuition and certain expenses for secondary school science teachers who wish to use the 1955 Cornell summer session for advanced work. The du Pont grant was made to Cornell because of the long-standing interest there in science teaching and the unusual degree of collaboration between its School of Education and its science departments. Both programs are under the general direction of *Dr. Phillip G. Johnson of the School of Education,* to whom inquiries should be addressed.

• **Caryl P. Haskins,** President and Director of Research of Haskins Laboratories, New York City, was recently elected President of the Carnegie Institute of Washington. He succeeds Dr. Vannevar Bush, who retires January 1, 1956.

• **Edward M. Palmquist** has been appointed Program Director for Education in the Sciences at the National Science Foundation. He will be on leave of absence from the University of Missouri, where he is chairman of the Dept. of Botany.

• **Kenneth S. Cole,** formerly Technical Director, Naval Medical Research Institute, has been appointed Chief of the Laboratory of Biophysics, National Institute of Neurological Diseases and Blindness of the National Institute of Health. He will direct and coordinate an extensive program of fundamental biophysical research in neurological diseases and sensory disorders.

• **The Third International Congress of Biochemistry** will be held at Brussels, Belgium, August 1-6, 1955. Information or programs may be obtained from the *Secretary-General, Claude Liebecq, 17, Place Delcour, Liege, Belgium.*

• **The 20th Cold Spring Harbor Symposium on Quantitative Biology** will be held June 6-13, 1955. The topic will be *Population Genetics: the Nature and Causes of Genetic Variability in Populations.* The objective of this year's Symposium is to bring leading workers together in an effort to establish an area of agreement on fundamental concepts common to various divisions of population genetics—an area that will facilitate a rapid exploitation of advances in one division by workers in the others. Discussions will focus on the following topics: general population genetics theory, theory of quantitative genetics, selection in plants, selection in animals, genetic variability and polymorphism, populations in time and space, and integration of genotypes. Among the invited participants will be 30 from countries outside the United States, including Belgium, Brazil, Chile, France, Great Britain, Italy, Japan, Spain, Sweden, and Yugoslavia, as well as Africa and Australia. This year's meeting is being sponsored by the Carnegie Corporation of New York, the Association for the Aid of Crippled Children, and The Rockefeller Foundation. The Symposium is open to all who are interested, but because of space limitations it is important to make reservations. For program and information address the *Biological Laboratory, Cold Spring Harbor, New York.*

• **The Biological Sciences Division of the Office of Naval Research, has awarded the following research contracts** to universities and non-profit research institutions for periods of from one to three years.

P. B. van Weel, University of Hawaii. Digestive Physiology Of Marine Animals In Relation To Coral Reef Destruction; *Hugh G. Gauch,* University of Maryland. Mass Culture of Unicellular Algae; *Philip B. Armstrong,* Marine Biological Laboratory. Studies In Marine Biology; *Martin W. Johnson,* Scripps Institution of Oceanography. Marine Wood Boring Organisms; *Demorest Davenport,* University of California. Behavior And Specificity In Marine Symbioses; *Theodore J. Walker,* Scripps Institution of Oceanography. Studies Of Biological Mechanism Of Obstacle Detection; *Talbot H. Waterman,* Bermuda Biological Station for Research. Nutrition, Feeding, And Physiology Of Deep Sea Animals; *R. R. Ronkin,* University of Delaware. Energetics Of Ciliary Motion; *W. E. Martin,* University of Southern California. Marine Organisms Producing Swimmer's Itch; *J. G. Pratt,* Duke University. Studies Of Orientation In Animals; *Donald S. Farner,* State College of Washington. Studies Of Photoperiodic Influence On Animals; *J. E. Cushing, Jr.,* University of California. Immunology Of Marine Animals; *Charles Lane,* University of Miami. General Biology Of Marine Borers; *A. D. Hasler,* University of Wisconsin. Mass Movement Of Fish; *William E. Schevill,* Woods Hole Oceanographic Institution. Underwater Biologic Noise; *Paul Weiss,* National Research Council. An International Conference Of Marine Biological Laboratory Directors; *Luigi Provasoli,* Haskins Laboratories. Factors Determining Growth In Marine Algae And Protozoa; *Henry van der Schalie,* University of Michigan. Studies Of Organisms Related To The Vector Of The Disease Schistosomiases; *J. M. Woodward,* University of Tennessee. The Effect Of Bacterium Tularense On Animal Hosts; *Edward Steers,* University of Maryland. The Metabolism of Purines; *Max Lauffer,* University of Pittsburgh. Biophysical Investigations On Bacteriophages; *Cora M. Downs,* University of Kansas. Pathogenesis And Immunity In Tularemia; *M. L. Speck,* University of North Carolina. Study Of Certain Growth Stimulants For Lactic Acid Bacteria; *Milton Huppert,* University of North Carolina. A Study Of Yeast Infections Following Antibiotic Therapy; *F. G. Smith,* Iowa State College. Preservation Of Spores Of Puccinia By Lyophilization; *Louis Weinstein,* Massachusetts Memorial Hospitals. The Production Of Immune Substances In Living Bodies; *Helen Simpson Vishniac,* Yale University. Research In Marine Fungi; *Stanley Marcus,* University of Utah. Laboratory Diagnosis, Treatment And Resistance In Systemic Mycotic Infection; *P. K. Smith,* George Washington University. Possible Inhibitors In The Virus-Host Relationship; *Albert P. McKee,* State University of Iowa. The Role Of Complement In The Body; *H. C. Lichstein,* University of Minnesota. Enzymic Factors Concerned With The Virulence Of Certain Bacterial Species; *H. O. Halverson,* University of Illinois. The Mechanism Of Heat Resistance Of Bacterial Spores; *Harry E. Morton,* University of Pennsylvania. Studies On Pleuropneumonia-Like Organisms; *B. A. Briody,* Hahnemann Medical College. Study Of Variation In Viruses; *Ralph W. Macy,* Reed College. Studies On Animal Parasites; *H. H. Thornberry,* University of Illinois. Factors Influencing Plant Virus Infections; *W. J. van Wagtendonk,* Indiana University. The Role Of Steroids In The Metabolism Of Microorganisms; *J. W. Foster,* University of Texas. Spore Formation And Germination In Bacteria; *J. Carroll Bell,* University of Colorado School of Medicine. The Effects Of Chemical Compounds On The Tubercle Bacillus; *D. Weinman,* Yale University. Transmission And Epidemiology Of Toxoplasmosis; *R. B. Johnson,* University of New Mexico. Isolation, Purification And Testing Of Bacterial Somatic Antigens; *R. E. Kallio,* State University of Iowa. Production And Purification Of Clostridial Collagenase; *Orville Wyss,* University of Texas. Variation In The Genus Azotobacter; *Torbjorn Moll,* State College of Washington. Concurrent Effect Between Virus And Bacteria In Interic Infections; *N. R. Gerhold,* Colorado A & M College. Spore Dispersal Patterns Of Plant Pathogens; *Morris F. Shaffer,* Tulane University School of Medicine. Antigenic And Cultural Properties Of Nocardia; *S. S. Elberg,* University of California. Trace Elements And Bacterial Virulence; *Horace M. Gezon,* University of Pittsburgh. The Effect Of Antibiotics On Shigella Organisms; *Edward D. Garber,* University of Chicago. The Nature Of Resistance And Susceptibility To Infectious Agents; *Murray Sanders,* University of Miami. Propagation Of Animal Viruses In Marine Embryonic Cells; *J. J. Lehman,* Colorado A & M College. Use Of Metabolites In The Reactivation Of Microorganisms; *C. M. Pomerat,* University of Texas Medical Branch. Studies On Cellular Mechanisms In Relation To Body Defenses; *R. J. Strawinski,* Louisiana State University. Microbial Oxidation Of Hydrocarbon Gases; *S. P. Halbert,* Columbia University. The Relationship Of A Bacterial Toxin To The Pathogenesis Of Rheumatic Fever; *M. Demerec,* Long Island Biological Association. Microbial Resistance To Chemical And Physical Agents; *Rolf Freter,* Loyola University School of Medicine. Experimental Enteric Infections Of Laboratory Animals; *C. Phillip Miller,* University of Chicago. Role Of The Intestinal Microflora In Resistance To Enteric Infections; *L. W. Parr,* George Washington University. Factors Involved In Resistance To And Recovery From Shigellosis; *W. H. Price,* Johns Hopkins University School of Hygiene and Public Health. Certain Disease Agents and Their Insect Vectors; *E. Sheppard* and *I. S. Wright,* Cornell University. Electrostatic Forces In Blood; *W. J. Fry,* University of Illinois. Effects of Ultrasound On Nerve Tissue; *R. L. Riley,* Johns Hopkins University. Instrumentation And Research On Pulmonary Function; *K. E. Penrod,* Duke University. Mechanism Of Oxygen Toxicity; *H. Specht,* National Institutes of Health. Respiratory Function In Underwater Swimmers; *F. O. Schmitt,* Massachusetts Institute of Technology. Composition And Properties Of Nerve Proteins; *A. A. Ward,* University of Washington. Experimental Concussion; *E. D. Gardner,* Wayne University. Study Of Certain Pathways In The Nervous System; *A. W. Richardson,* University of Indiana. Biological Effects Of Microwave Irradiation; *R. Truell,* Brown University. Biological Effects Of Ultrasound; *R. T. Nieset,* Tulane University. Physical And Physiological Factors In The Biological Effects Of Microwaves; *H. P. Schwan,* University of Pennsylvania. Influence Of Ultrahigh Frequency Electromagnetic Radiation On Biological Material; *H. Bacchus* and *C. E. Leese,* George Washington University. Ascorbic Acid

And Adrenal Cortex Relationships; *S. R. Rosenthal*, University of Illinois. A Study Of Perfusates Of Thermally Injured Skin; *R. Soberman*, New York University. Determination Of Basic Differences In Edema Of Various Pathologic Origins; *G. M. Austin*, University of Pennsylvania. Investigation Of Neurophysiological Properties Of The Human Spinal Cord; *E. C. Hoff*, Medical College of Virginia. Cerebral Regulation Of The Autonomic Nervous System; *N. Lifson*, University of Minnesota. Development Of Technique To Measure Total Carbon Dioxide Output By Use Of Doubly Labeled Body Water; *L. H. Kyle*, Georgetown University. Use Of Specific Gravity Method To Study Body Composition; *S. T. Dempster*, University of Michigan. Study Of The Coordinated Action Of Muscles On Body Joints; *C. Wilson* and *L. E. Morehouse*, Management and Marketing Research Corporation. Measurement Of Accelerative Forces On Bodies In Aircraft Accidents; *N. Pace*, University of California. Physiological Properties Of Intracellular Components; *R. G. Grenell*, University of Maryland. Effects Of Anoxia On Neuronal Structure And Function; *J. N. Williams*, University of Wisconsin. Effects Of Enzyme Activity Of Animal Tissue; *V. J. Wulff*, Syracuse University. Electrophysiology Of The Visual Pathway; *J. C. Opsahl*, University of Alberta. Pituitary And Adrenal-Hyaluronidase Relationships; *J. M. R. Delgado*, Yale University. Neurological Mechanisms In Anoxia and Epilepsy; *A. T. Miller*, University of North Carolina. Influence Of Body Type And Composition On Work Capacity And Thermal Regulation; *J. D. Hardy*, University of Pennsylvania. Effects Of Thermal Radiation On Skin; *J. D. Hardy*, University of Pennsylvania. Thermal Radiation And Thermal Stress; *S. F. Cook*, University of California. Effects Of Prolonged Exposure To High Altitudes On Growth And Metabolism; *H. P. Schwan*, University Of Pennsylvania. Electrical And Mechanical Properties Of Biological Materials; *E. L. Alpen*, Naval Radiological Defense Laboratory. Symposium On Thermal Injury; *H. H. Hasbrook*, Cornell University. Crash Injury Research.

The A.I.B.S. Reports

• **The June List of registrants in the AIBS Placement Service** is now being prepared. The deadline for application is *April 28th*. Members of the Member Societies may register with the payment of $2.00 per listing; members of Affiliate Societies, $5.00; and non-members are required to pay a fee of $10.00 per listing. Confidential listings are also available for $20.00 per year. Employers may purchase the list of registrants for $1.00.

• **The AIBS Advisory Committee in Biology to the Office of Naval Research** met in Washington, D.C., February 10-11, 1955 to evaluate the scientific merits of 25 proposals and currently existing proposals. The Committee is under the Chairmanship of Dr. Frank Brown, Jr.

• On March 10, 1955 the **AIBS Advisory Committee on Physiological Psychology to the Office of Naval Research** met in Pensacola, Florida, in conjunction with a special ONR symposium on this subject. The Committee members considered 6 current proposals and were guests at the Symposium. Dr. Carl Pfaffman is Chairman of this Committee.

• **Irvin C. Mohler** has joined the staff of AIBS to handle the ONR Advisory Committees contract and the NSF Register of Scientific Personnel. Mr. Mohler holds an M.S. Degree from Pennsylvania State University in microbiology and has been with the Dept. of Defense in Washington for the past several years. Mr. Mohler will also direct the activities of the AIBS Placement Service.

From the Societies

• **Officers of Phi Sigma Society,** honorary biological society, are: President, Karl F. Lagler; Vice-President, Samuel L. Meyer; Executive Secretary-Treasurer, Fred S. Orcutt, Dept. of Biology, Virginia Polytechnic Institute, Blacksburg, Va.; Editor of *The Biologist*, A. M. Keefe, Dept. of Biology, St. Norbert College, West De Pere, Wisconsin.

• **The A.A.A.S. Meetings** for the next three years will be held in the following cities: Atlanta, Ga., 1955; New York, 1956; Indianapolis, 1957; and Washington, D.C., 1958.

• **The following societies will meet at East Lansing, September 5-9:**

Amer. Bryological Society
Amer. Fern Society
Amer. Microscopial Society
Amer. Soc. for Horticultural Science
Amer. Soc. of Human Genetics
Amer. Soc. of Limnology & Oceanography
Amer. Soc. of Naturalists
Amer. Soc. of Plant Physiologists
Amer. Soc. of Plant Taxonomists
Amer. Soc. of Zoologists
Biometric Society (ENAR)
Botanical Society of America
Ecological Society of America
Genetics Society of America
Mycological Society of America
Nature Conservancy
Phycological Society of America
Potato Association of America
Society for Industrial Microbiology
Society of Protozoologists
Society for the Study of Evolution
Animal Welfare Institute

Letters to the Editor

Botany in the Graduate Record Examination

December 1955

In the spring of 1953, a group of American colleges gave the Graduate Record Examination to the entire graduating class, as part of a study under a grant from the Fund for the Advancement of Education. This was expected to indicate degree of success in liberal arts training. Results in some cases led to curriculum changes, a fact that occasions these remarks. Faculty members were permitted to read the questions, but not make transcripts. In one hurried perusal, I made a mental count of these questions which were distinctly botanical or zoological, and those which could be properly called biological. Totals given below may not be precisely accurate, but are close enough for discussion.

General Section (Total 65 questions on biology)		Special Section (Total 279 questions on biology)	
Botany	8	Botany	60
Biology	19	Biology	52
Zoology	38	Zoology	167

In both groups, the number of zoological questions greatly exceeds that of botanical and biological questions combined. In the general section there are nearly five times as many zoological as botanical; in the special section nearly three times as many. Why this one-sided ratio? It can scarcely be justified in terms of importance to the general public. Agriculture, horticulture, conservation, and economic botany are hardly overshadowed in a ratio of 5 to 1 by zoological subjects, even including medicine (which itself involves botanical matter in pathology and pharmacy). Neither can demands of students in pre-professional training justify the discrepancy. M. H. Trytten in 1949 (*Science* 109: 505-508) reported the total number of B.S. majors in U.S. schools in 1947-48 as 8,790 in all plant sciences, 2,182 in all animal sciences. Total graduate appointments were 637 in botany (excluding agriculture, forestry, horticulture, and pharmacology), 734 in zoology (excluding anatomy and entomology).

Many can testify from personal experience that the Graduate Record Examination reflects actual teaching personnel and course offerings in many U.S. colleges. The personnel of the committee which prepared the biology questions is illuminating. The five members include one each from a state college, a medical school, a teachers college, a state university, and a private university. Their professional interests as given in *American Men of Science* are: testing, educational psychology; physiological chemistry; zoology—cellular physiology, biophysics; economic biology—mammalogy; entomology; botany; radiology—biological effects of radiation.

The real roots lie deeper than committee personnel, or prevalence of unbalanced curriculums in present day colleges. These represent the consequences of developments which began in the last century. Population increase, rise of great urban centers, and shift of the U.S. from a predominately agricultural to a predominately industrial nation undoubtedly encouraged de-emphasis on plant sciences in teaching. Another influence has probably been more decisive. Of those college students interested in plant sciences, most will take degrees in agricultural colleges or forestry schools, which have arisen within the past 90 years. But there is not an equivalent selection of the largest single group interested in animal sciences; those planning to go into medicine. Consequently the so-called liberal arts colleges do not have a balanced sampling. The pre-medical students are a major pressure group, for whose benefit the curriculum has been increasingly modified. We now have colleges of pre-medicine, equivalent to colleges of agriculture, forestry schools, or teachers colleges. Liberal arts in any proper sense to many of them have ceased to be.

As a measure and symptom of our time, the Graduate Record Examination is a faithful witness. As a gauge of the broad, impartial training which a liberal education is supposed to be, nothing could be falser.

LLOYD H. SHINNERS, Director of Herbarium,
Southern Methodist University, Dallas, Texas.

The Biology Library

One copy of each publication submitted for listing should be sent to the Editor, The AIBS Bulletin, 2000 P Street, N.W., Washington 6, D. C. Only books published within a year of receipt will be reviewed.

ANIMAL SCIENCES

Dragonflies of North America. JAMES G. NEEDHAM and MINTER J. WESTFALL, JR. 615 pgs., 341 fig. University of California Press, Berkeley 4, Calif. (1955) $12.50.

Entomologists, expert and amateur alike, will find this an indispensable manual if they are interested in the Odonata. The book is designed primarily for the identification of dragonflies but it is more than that. Dragonfly nymphs, often neglected in the past, are discussed, keys supplied and illustrations provided. Practical methods and implements for collecting, preserving, and studying dragonflies are included. The range of species is given in terms of states, rather than in terms of life zones. Throughout the book the language used is simple and clear and common names are supplied whenever possible. The authors have managed to lend to what might have been a highly technical volume a real appreciation of these insects in their natural habitats.

World Outside My Door. OLIVE BOWN GOIN. 184 pgs. The Macmillan Company, 60 Fifth Ave., New York 11, N.Y. (1955) $3.50.

The author is the biologist wife of a biologist at the University of Florida. In her backyard on a hammock area at the outskirts of Gainesville, Mrs. Goin began to keep a journal about the creatures she observed. Gradually her casual observations became close observations and this charming book tells the story. Written in a style that will be enjoyed by everyone, the book should be particularly appealing to those living in similar southern regions with the same species. However, it should inspire possessors of "backyards" everywhere to watch more carefully for the fascinating array of animals and birds that can inhabit one small piece of territory. Attractive cartoon-type drawings by Esther Coogle illustrate in a casual fashion.

Evolution of the Vertebrates. EDWIN H. COLBERT. 479 pgs., 122 illus. John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N.Y. (1955) $8.95.

Dr. Colbert is Curator of Fossil Reptiles and Amphibians at the American Museum of Natural History and Professor of Vertebrate Paleontology at Columbia University. The book is intended to be a general textbook on vertebrate paleontology; it is not meant for the specialist or the lay reader. The approach is via the fossil record. Principles of evolution are discussed or mentioned in passing but the book is not built around them. Neither is it concerned with the mechanisms of evolution as revealed by genetics. A feeling of the passing of geologic time is established by the author and maintained throughout. The text material is enhanced by a liberal supply of bone drawings, excellent restorations and phylogenies.

The Mammalian Fetus: Physiological Aspects of Development. Cold Spring Harbor Symposia on Quantitative Biology, Vol. 19. 225 pgs., 202 fig., 5 pl. The Biological Laboratory, Cold Spring Harbor, New York. (1955) $8.00 plus postage.

The 19th annual Cold Spring Harbor Symposia, held June 7-14, 1954, brought together more than 125 American and European scientists to discuss the development and physiology of the mammalian fetus. The twenty-seven lectures presented by invited participants, and the discussions which followed them, are recorded in this volume. The meetings began with a consideration of early embryonic development, then took up a variety of integrated physiological activities necessary for the development of the fetus, and finally discussed the metabolic characteristics of the fetus as a whole and of its different parts.

Bower Birds. A. J. MARSHALL. 208 pgs., 21 fig., 26 pl. Oxford University Press, 114 Fifth Avenue, New York 11, N.Y. (1954) $4.80.

It has been known for over a century that the bower-birds, a family of passerines confined to Australia, New Guinea and nearby island, build display-grounds and decorate them in various fashions. Because of these extraordinary habits a large popular literature has grown up, much of it anthropomorphic, and most of it, according to Dr. Marshall, erroneous. Following a series of histo-physiological studies, and an examination of the ecology and literature of each species of bower-bird, the author writes that the display behavior is definitely connected with sexual reproduction, contrary to popular belief. The book is liberally illustrated and written in a style that should appeal to zoologists as well as ornithologists.

Mosquitoes—Their Bionomics and Relation to Disease. WILLIAM R. HORSFALL. 723 pgs., 206 tables. The Ronald Press Company, 15 East 26th St., New York 10, N.Y. (1955) $16.00.

Dr. Horsfall, Associate Professor of Entomology at the University of Illinois, has provided research workers, sanitarians, epidemiologists, and ecologists with a complete summary of the bionomics of the subfamily of mosquitoes. General information on the subfamily as a whole and on each genus precedes the more detailed, systematic treatment of each species. Those concerned with the control of mosquitoes will find the most recent methods outlined for each species, as well as facts about toxinosis in the egg, larva, pupa, and adult stages. A full discussion is given to the role played by mosquitoes in spreading malaria, yellow fever, and other diseases. As well as outlining

the results of research to date, the book indicates avenues of investigation for tomorrow.

The Vertebrate Body. A. S. ROMER. 644 pgs., illus. W. B. Saunders Company, West Washington Square, Philadelphia 5, Pa. (Second edition, 1955) $7.00.

The second edition of Dr. Romer's well-established text, *The Vertebrate Body*, contains some rearrangement, additions and textual changes. Essentially the book remains the same. As before the emphasis is not on the human body, a truly comparative approach is maintained, adequate illustrations given, the developmental viewpoint established, histological data supplied, and the unity of function and structure shown for all parts of the body.

The Fossil Evidence for Human Evolution. W. E. LEGROS CLARK. 181 pgs., 20 fig. University of Chicago Press, 5750 Ellis Ave., Chicago 37, Ill. (1955) $6.00.

The University of Chicago Press recently began publication of a new series known as "The Scientist's Library: Biology and Medicine." This small volume, whose author is Professor of Anatomy at Oxford, is one of the first biological contributions in the series. No attempt is made to provide an account of all the fossil evidence bearing on human evolution. Instead some of the main sources of evidence, in abbreviated form, and the conclusions that may be drawn from them, are discussed.

Applied Entomology. H. T. FERNALD and H. H. SHEPARD. 385 pgs., 269 fig. McGraw-Hill Book Company, 330 West 42nd St., New York 36, N.Y. (5th edition, 1955) $7.00.

The last (fourth) edition of this text appeared before the discovery of such insecticides as DDT. The section on control, therefore, has been brought up-to-date to include the newer chemicals, methods of application, precautions and government regulations of insecticides. Insect physiology has been emphasized in this edition as well. It continues to be a text well adapted for agricultural and horticulture students, and those preparing to specialize in economic entomology.

Mosquito Culture Techniques and Experimental Procedures. Bulletin 3. HELEN TREMBLEY. 73 pgs., 17 fig. American Mosquito Control Association, c/o C. T. Williamson, Business Mgr., Suffolk County Mosq. Exterm. Co., Yaphank, L.I., N.Y. (1955). Available upon request.

A neat, exact and well-illustrated Bulletin, *Mosquito Culture Techniques* should be a valuable addition to the laboratory of entomologists, malariologists and all others who raise mosquitoes for research purposes.

The Mammals of the Huachuca Mountains, Southeastern Arizona. D. F. HOFFMEISTER and W. W. GOODPASTER. 152 pgs. University of Illinois Press, Urbana, Ill. (1954) $4.00 (cloth), $3.00 (paper).

This is Volume XXIV, No. 1 of the Illinois Biological Monographs. The Huachuca Mountains straddle the Mexican Boundary near the 110th parallel and form high, cool mountain ranges rising above low, hot deserts. A great diversity of life occurs in these mountains and this book tells the results of a survey of the mammals of the region.

The Evolution and Taxonomy of the Sarcophaginae. SELWYN S. ROBACK. 181 pgs. University of Illinois Press, Urbana, Ill. (1954) $5.00 (cloth), $4.00 (paper).

The subfamily Sarcophaginae, of the Sarcophagidae, or fleshflies, contain about 1,200 species which vary greatly in size. Food habits vary from parasitism in humans to feeding on dung and decaying vegetable material. The work on which this book is based is an attempt to discover the probable phylogeny and the genera and generic groupings in the subfamily, based primarily on aedeagal structure.

PLANT SCIENCES

Small Fruit Culture. J. S. SHOEMAKER. 447 pgs., 75 illus. McGraw-Hill Book Company, 300 West 42nd St., New York 36, N.Y. (Third edition, 1955) $6.50.

The small fruits discussed in this book are grapes, strawberries, raspberries, blackberries and related types, currants, gooseberries, blueberries and cranberries. New features of this third edition include: improved cultural practices; newer varieties; up-to-date training methods for grapes, strawberries and bramble fruits; pruning; fertilizer practices; minor elements; mulching; control of weeds by chemicals; French hybrid grapes; the development of virus-free strawberries; the importance of fall-bearing strawberries and raspberries and the use of chemicals to stop excessive runner formation in strawberries. The book is well illustrated and written in a fashion that will make it easy to use as a reference handbook.

An Introduction to Plant Taxonomy. GEORGE H. M. LAWRENCE. 179 pgs., 69 figs. The Macmillan Company, 60 Fifth Avenue, New York 11, N.Y. (1955) $3.25.

The author says in his preface "This book is written for the adult amateur botanist and the student of a local flora course at the college level". It is restricted to the vascular plants—ferns, gymnosperms, and flowering plants. Plant structures, contemporary systems of classification, fundamental principles of plant nomenclatures and the mechanics of plant identification, including preparation and preservation of herbarium specimens, are included. Illustrations are original and adequate.

Handbook of Algae. HERMAN SILVA FOREST. 469 pgs., 698 fig. University of Tennessee Press, Knoxville 16, Tenn. (1954).

This handbook was prepared primarily for use in Tennessee and the Southeastern States. It summarizes several "checklists" published during recent years by phycologists of this region. A key to genera precedes the large section of the book devoted to more detailed description of each family and genus. Illustrations are line drawings.

Fruit Nutrition. Edited by NORMAN F. CHILDERS. 907 pgs., illus. Horticultural Publication of Rutgers University, New Brunswick, N.J. (1954).

The field of plant nutrients has been the subject of study for centuries, beginning with rice and tea in the Orient. In the Western World grain crops and fruit trees received the attention of scientists and the accumulated literature is overwhelming. This review volume attempts to sort out pertinent facts and present a proper perspective of the state of our knowledge. Over twenty authors have contributed chapters.

Plant Analysis and Fertilizer Problems. Edited by P. PREVOT. A Symposium of the 8th International Botanical Congress, Paris, 1954. 263 pgs., illus. Published by I.R.H.O., 12 Square Petrarque, Paris 16, France. (1955) $4.00.

This volume is the record of the first international symposium dealing with the fundamentals, techniques and applications of plant tissue analysis methods to problems of fertilization of plants. It is evidence of the growing body of literature on this subject, the increasing number of workers in the field and the value of this method of evaluation. Applications of plant analysis of such diverse crops as coconut, coffee, citrus, tung, grapes, deciduous fruits, wheat, sugar beet, sugar cane, oil palms, peanuts and others are considered. The informal discussions and debates following the presentation of each paper are included.

Botany, Principles and Problems. EDMUND W. SINNOTT and KATHERINE S. WILSON. 528 pgs., illus. McGraw-Hill Book Company, 330 West 42nd St., New York 36, N.Y. (5th edition, 1955) $6.75.

Long a standard work, the fifth edition of the Sinnott and Wilson *Botany* is a handsome new production. The format has

been changed to a larger page size, with double columns and over 200 new and excellent illustrations have been added. The contents have been rewritten to include modern developments in plant science, and several completely new chapters have been added. All revisions, however, maintain the approach to the subject that has kept this book in popular demand for over 25 years.

Cryptogamic Botany. Vol. I. Algae and Fungi. Gilbert M. SMITH. 546 pgs., 311 fig. McGraw-Hill Book Company, 330 West 42nd St., New York 36, N.Y. (2nd edition, 1955) $8.50.

The second edition of the well-known and widely-used Smith's *Cryptogamic Botany* provides a timely revision. As before one chapter is devoted to each phylum of plants. The introductory portion of each chapter has been rewritten and a wider selection of representative genera described. The two volumes are designed for students who have had an introductory course in botany and wish to continue in morphology. Volume I covers algae and fungi.

Cryptogamic Botany. Vol. II. Bryophytes and Pteridophytes. GILBERT M. SMITH, 399 pgs., 254 fig. McGraw-Hill Book Company, 330 West 42nd St., New York 36, N.Y. (2nd edition, 1955) $8.00.

Volume II, covering the bryophytes and pteridophytes, shows revisions of the discussions of the major taxa and a wider geographic distribution of the representative "types".

MISCELLANEOUS

The Harvey Lectures. (1953-54) 299 pgs. Academic Press Inc., 125 East 23rd St., New York 10, N.Y. (1955) $7.50.

The now-famous Harvey Lectures are delivered annually under the auspices of The Harvey Society of New York and the patronage of the New York Academy of Science. Lecturers (and their subjects) for 1953-54 were: *Claude Fromageot*, The Metabolism of Sulfur and Its Relations to General Metabolism; *Hans H. Weber*, Adenosine Triphosphate and Motility of Living Systems; *David Nachmansohn*, Metabolism and Function of the Nerve Cell; *Paul Klemperer*, The Significance of the Intermediate Substances of the Connective Tissue in Human Disease; *R. D. Hotchkiss*, The Genetic Chemistry of the Pneumococcal Transformations; *Britton Chance*, Enzymes in Action in Living Cells: The Steady State of Reduced Nucleotides; *A. L. Lehninger*, Oxidative Phosphorylation; *Linus Pauling*, Abnormality of Hemoglobin Molecules in Hereditary Hemolytic Anemias; and *J. D. Hardy*, Control of Heat Production in Physiologic Temperature Regulation.

Genetic Homeostasis. I. MICHAEL LERNER. 134 pgs., 14 fig. John Wiley & Sons, 440 Fourth Ave., New York 16, N.Y. (1954) $3.25.

The author undertook the preparation of this volume while on a Guggenheim Foundation Fellowship at the Institute of Genetics (University of Pavia) and the Istituto Italiano di Idrobiologia (Pallanza). His essay proposes to demonstrate that "mendelian populations possess self-regulating properties, to establish a connexion between genetic and developmental homeostasis, to suggest that heterozygosity provides a basis for both phenomena, and to consider some consequences of these points for evolution and breeding". Dr. Lerner is Professor of Genetics in Poultry Science at the University of California.

A Manual of Paper Chromatography and Paper Electrophoresis. R. J. BLOCK, E. L. DURRUM and GUNTER ZWEIG. 484 pgs., illus. Academic Press Inc., 125 East 23rd St., New York 10, N.Y. (1955) $8.00.

Two of the most recent analytical tools of the research biologist, paper chromatography and paper electrophoresis, have greatly facilitated the qualitative and quantitative analyses of amino acids, proteins, and steroids. This volume reviews such research in terms of basic principles and methodology. Established techniques are re-evaluated and new procedures and applications described. Sufficiently detailed to be used as a manual in the laboratory, this book should also enable the reader to discover the particular technique needed for his research problem without recourse to an extensive search of the literature.

Perspectives and Horizons in Microbiology. Edited by SELMAN A. WAKSMAN. 220 pgs. Rutgers University Press, New Brunswick, N.J. (1955) $3.50.

This book is a collection of monographs delivered at the symposium arranged for the dedication of the Institute of Microbiology, Rutgers University on June 7, 1954. The chapters cover such aspects of the field as metapoietic integrations, genetics and microbiology, molds as metabolic models and pathways in biological nitrogen fixation by such eminent microbiologists as André Lwoff, J. Lederberg, J. Foster, Perry Willson and Selman Waksman. The book is not of value as a textbook but makes very interesting and informative supplemental reading.

Recent Developments in Cell Physiology. J. A. KITCHING. 206 pgs., illus. Academic Press Inc., 125 East 23rd St., New York 10, N.Y. (1954) $6.50.

Since 1948, the Colston Research Society at Bristol University has been sponsoring annual symposia. This volume records the papers presented during the 1954 symposia, *Recent Development in Cell Physiology*. Eighteen participants, from England, Denmark and Belgium, presented papers: J. F. Danielli, H. J. Koch, H. H. Ussing, R. D. Keynes, E. W. Yemm, H. Klenow, E. Hoff-Jørgensen, J. Brachet, C. H. Waddington, H. V. Brøndsted, E. Zeuthen and O. Scherbaum, O. Maaløe and K. G. Lark, M. Westergaard and H. Hirsch, M. M. Swann, and J. A. Kitching. Discussions that followed the presentation of each paper and extensive bibliographies are included.

Analysis of Development. Edited by BENJAMIN H. WILLIER, PAUL A. WEISS and VIKTOR HAMBURGER. 735 pgs., 248 fig. W. B. Saunders, West Washington Square, Philadelphia 5, Pa. (1955) $15.00.

The rapidly accelerating trend to move from descriptive reporting to analysis of dynamic and causal aspects of embryogenesis has created an acute need, now admirably met by this well-written, judiciously balanced, forward-looking volume, for an up-to-date synthesis of contemporary knowledge in the field, for a level of discussion intermediate between the elementary textbooks and the rising spate of special symposia and reports. Twenty-eight distinguished biologists contributed independently prepared chapters covering every major topic in development of vertebrates and invertebrates. The book indicates where our knowledge of the principles and mechanisms of animal ontogeny now stands, what problems await clarification, exploration or initial attack and what guidance existing theories can give to research.

The Structural Chemistry of Proteins. H. D. SPRINGALL. 376 pgs., illus. Academic Press Inc., 125 East 23rd St., New York 10, N.Y. (1954) $6.80.

The usual methods of discussing the chemical or physicochemical properties of proteins are abandoned in this book to be replaced by an up-to-date survey of their structural chemistry. Dr. Springall based the book on a course of lectures delivered at the University of Manchester to honors and post-graduate chemistry students. Besides advanced chemistry students, the subject should appeal to industrial and academic research workers and those interested in the chemistry of biological systems.

Cellular Metabolism and Infections. Edited by E. RACKER. 196 pgs. Academic Press Inc., 125 East 23rd St., New York 10, N.Y. (1954) $4.80.

The contents of this book are the papers presented during the 8th Symposium of the Section on Microbiology of the New York Academy of Medicine. Divided into two parts, one on comparative biochemistry, the second on the metabolic aspects of the infectious process itself, papers are provided by the

following speakers: R. Y. Stanier, Ernest Bueding, H. A. Krebs, W. E. Knox, Arnold D. Welch, Bernard D. Davis, Seymour S. Cohen, Rene J. Dubos, A. M. Pappenheimer, Jr., Mark H. Adams, S. E. Luria, E. Racker, D. W. Wooley, Hubert Bloch, Benjamin Mandel, J. W. Beard, Gifford B. Pinchot and A. Lwoff.

The Elements of Probability Theory and Some of Its Applications. HARALD CRAMER. 281 pgs. John Wiley & Sons, 440 Fourth Ave., New York 16, N.Y. (1955) $7.00.

The author is one of Sweden's foremost mathematical statisticians and is well known in the United States, holding an honorary D.Sc. from Princeton University. The book calls for a minimum of background knowledge and training. Part I covers the foundations, with definitions, rules and basic applications. Part II treats random variables and probability distributions. Part III is a discussion of applications. This last section should be of particular interest to biologists, engineers and others who wish to apply statistical methods to their research. Graded exercises and problems are included.

Active Transport and Secretion. Symposia of the Society for Experimental Biology. No. VIII. Edited by R. BROWN and J. F. DANIELLI. 516 pgs. Academic Press Inc., 125 East 23rd St., New York 10, N.Y. (1955) $8.00.

Active Transport and Secretion was the subject of the 8th Symposium of the Society for Experimental Biology, held in Bangor, July 1953. The first three papers are introductory; the next four are on active transport phenomena in red blood cells, yeast and bacteria; a group of five papers are concerned with active transport of ions in plants; four discuss transport of ions in animal cells; and the remaining three papers are concerned with active movements of proteins and fats. Authors include: J. A. Ramsay, H. Davson, T. Rosenberg, J. R. Robinson, J. A. Kitching, D. C. Spanner, J. W. L. Beament, P. G. Lefevre, W. Wilbrandt, W. F. Widdas, A. Rothstein, M. Maizels, E. J. Harris, E. F. Gale, P. Mitchell, H. Lundegardh, E. J. Conway, J. F. Sutcliffe, R. S. Russell, F. C. Steward and F. K. Millar, H. Ussing, A. L. Hodgkin and R. D. Keynes, H. B. Steinbach, R. E. Davies, F. W. R. Brambell and W. A. Hemmings, A. C. Frazer, and J. F. Danielli.

Genetics and Human Heredity. J. BEN HILL and HELEN D. HILL. 526 pgs., 202 fig. McGraw-Hill Book Company, 330 West 42nd St., New York 36, N.Y. (1955) $6.50.

The title of this book is somewhat misleading since only a small portion of the subject matter is devoted to human heredity. The book is designed essentially for either liberal arts or agricultural students. The material is standard for any introductory genetics course. Illustrations are numerous and a considerable number of problems are given at the conclusion of each chapter.

The Chemistry of Lipids of Biochemical Significance. J. A. LOVERN. 132 pgs. John Wiley & Sons, 440 Fourth Ave., New York 16, N.Y. (1955) $1.75.

One of the Methuen Monographs in science, this book owes its origin and plan to a series of lectures delivered by the author at the University of Aberdeen in 1952. Chapters include: Structure of Lipids, Preparation and Analysis of Lipids, Lipids in the Tissues, the Dynamic State of Lipids in the Tissues, and The Function of Lipids.

The Human Organism. RUSSELL M. DE COURSEY. 550 pgs., illus. McGraw-Hill Book Company, 330 West 42nd St., New York 36, N.Y. (1955) $5.75.

Dr. De Coursey's book is designed specifically for the liberal arts student. The common medico-nursing slant is abandoned, with an emphasis on physiology replacing it. Anatomy is kept at a minimum. The latest advances in Rh factor, hormone physiology, artificial kidneys, adrenocortical hormone relation to arthritis and B_{12} treatment of pernicious anemia are discussed. The author writes in his preface, "the college student merges into the general public, where there is a great need for understanding human problems. Parents certainly need to know the fundamental principles of body structure and function which lead to an understanding of health and hygiene."

Conserving Natural Resources. Principles and Practice in a Democracy. SHIRLEY W. ALLEN. 347 pgs., 169 fig. McGraw-Hill Book Co., 330 West 42nd St., New York 36, N.Y. (1955) $5.50.

All aspects of the field of natural resources—physical, technical, legal, political, economic, social and human—are covered in this compact volume. In his preface the author states: "An earnest attempt has been made to keep always in mind three essentials of a sound conservation program: use with minimum waste, increasing productivity where possible and desirable, and seeing to it that natural resources are equitably distributed now and hereafter". Modern methods and techniques, the relation to natural resources of such modern phenomena as smog and synthetics, the competition between industry, transportation, residence, and testing agencies for land, the role of government in conservation and the success and failures of important conservation laws are all discussed.

Outlines of Enzyme Chemistry. J. B. NEILANDS and PAUL K. STUMPF. 315 pgs., illus. John Wiley & Sons, 440 Fourth Ave., New York 16, N.Y. (1955) $6.50.

Both authors of this book teach in Biochemistry Departments at the University of California, Berkeley. Their text is written for beginners and non-specialists in the field. Part I includes such topics as the history of enzyme chemistry, equilibria and ionization, isolation, purity criteria, and characterization methods. The physical chemistry of enzymes is treated in Part II. Part III concentrates on specific coenzymes, enzymes, and enzyme systems. Metabolic problems and enzyme synthesis are discussed in Part IV.

Advances in Virus Research. Volume II. Edited by K. M. SMITH and M. A. LAUFFER. 313 pgs. Academic Press Inc., 125 East 23rd St., New York 10, N.Y. (1954) $7.00.

The second volume of *Advances in Virus Research* contains review articles on plant viruses, viruses causing diseases of animals and man, chemical constitution of viruses, and the biophysical aspects of virus research. Authors include: W. W. Ackerman, F. C. Bawden, I. J. Bendet, T. Francis, Jr., F. O. Holmes, C. A. Knight, M. A. Lauffer, P. von Magnus, E. Pollard, and R. C. Williams. Volume I and Volume II together now form a comprehensive, balanced introduction to the latest achievements in this field.

Vitamins and Hormones. Advances in Research and Applications. Volume XII. Edited by R. S. HARRIS, G. F. MARRIAN and K. V. THIMANN. 305 pgs. Academic Press Inc., 125 East 23rd St., New York 10, N.Y. (1954) $7.50.

Thirteen authors have contributed to this XIIth volume of the Academic Press series on *Vitamins and Hormones*. Subjects discussed include: Chemistry of Vitamin B_{12}; The Intestinal Synthesis of Vitamins in the Ruminant; The Biochemistry and Pathology of Hypervitaminosis A; Vitamin A Requirements of Animal Species; Disturbances in Nutrition Relating to Liver Disease in Man; Light Regulation of Hormone Secretion; Estrogens and Related Substances in Plants; and Effects of Estrogens on Domestic Fowl and Applications in the Poultry Industry. Each article, as usual, contains a complete bibliography of recent literature.

Applied X-Rays. GEORGE L. CLARK. 843 pgs., 415 fig., McGraw-Hill Book Company, 330 West 42nd St., New York 36, N.Y. (Fourth edition, 1955) $12.50.

This is the fourth edition of an established, comprehensive volume on X-ray science. Included is history, instrumentation, engineering, physics, chemical effects, biology, medicine, crystallography, and structures and textures of materials. Most of the four hundred photographs and diagrams have not been previously published. Of particular interest to biologists is a new chapter dealing with the biological effects of X-rays based on the latest literature in radiology.

Radiation Biology. Volume II. Ultraviolet and Related Radiations. Edited by ALEXANDER HOLLAENDER. 593 pgs., illus. McGraw-Hill Book Company, 330 West 42nd St., New York 36, N.Y. (1955) $8.00.

Volume II in this three-volume series deals with ultraviolet and related radiations. The book should prove of special interest to investigators in food preservations, industrial applications of ultraviolet in general, health aspects of ultraviolet, and the use of ultraviolet as an analytical tool. As in Volume I the material covers the effects of radiation from the physical, chemical and biological points of view, with special emphasis on the cytological and genetical aspects of radiation damage.

Sonics. T. F. HUETER and R. H. BOLT. 456 pgs., illus. John Wiley & Sons, 440 Fourth Ave., New York 16, N.Y. (1955) $10.00.

New uses of sound waves in engineering and science are constantly being discovered. A practical presentation of this rapidly expanding field, from audible sounds to ultrasonics, is offered in *Sonics*. A background of basic physics is necessary and certainly physicists, chemists or engineers will find the book of more value than will biologists. Major emphasis is placed on the techniques and instrumentation for actual tasks in industry with the applications divided into two branches: sonic processing and sonic analysis.

Amino Acid Metabolism. Edited by W. D. McELROY and H. B. GLASS. 1048 pgs., illus. The Johns Hopkins Press, Homewood, Baltimore 18, Md. (1955) $12.50.

This volume contains the papers and discussions presented at a Symposium on Amino Acid Metabolism held at the Johns Hopkins University under the sponsorship of the McCollum-Pratt Institute on June 14-17, 1954. Contents are divided into the following sections: General Consideration of Amino Acid Metabolism; Metabolism of Glutamic Acid, Proline, Ornithine, Citrulline and Arinine; Metabolism of Histidine, Leucine, Isoleucine, Caline and Lysine; Metabolism of Methionine, Cysteine and Threonine; Metabolism of Glycine and Serine and Metabolism of Aromatic Amino Acids.

Cells and Societies. JOHN T. BONNER. 234 pgs., 46 fig. Princeton University Press, Princeton, N.J. (1955) $4.50.

Cells and Societies is a fascinating discussion of the characteristics and variations of animal societies from the howling monkeys of Barro Colorado Island to colonial and single-celled organisms. Three biological activities occur throughout: the need to take in food, perpetuation by reproduction, and some method of coordinating the group. Dr. Bonner compares various societies in terms of these three factors. The book should be enjoyed by biologists and layman alike for it is written in an eminently readable fashion.

Serological Approaches to Studies of Protein Structure and Metabolism. Edited by WILLIAM H. COLE. 97 pp. Rutgers University Press, New Brunswick, N.J. (1954).

This booklet offers the six papers presented during the Tenth Annual Conference of the Bureau of Biological Research at Rutgers. Subjects and authors are: Proteins as Antigens and Antibodies, Felix Haurowitz; The Precipitin Reaction and Studies of Native and Denatured Proteins and Derivatives, M. Heidelberger; Light Scattering and Ultracentrifugation Methods in Studies of Precipitin Systems and Their Application to Human Metabolism, David Gitlin; The Immunological Analysis of the Biosynthesis of a Protein, Melvin Cohn; The Use and Limitations of Serum-Agar Techniques in Studies of Proteins, J. Munoz; and The Measurement and Significance of Seriological Correspondence Among Proteins, Alan A. Boyden.

The Chemistry of Living Cells. HELEN R. DOWNES. 549 pgs. Harper and Brothers, 49 East 33rd St., New York 16, N.Y. (1955) $7.50.

The author, Professor of Chemistry at Barnard College, has prepared a biochemistry text that answers a need in emphasizing the general chemical processes common to all living cells. It can, therefore, be used by botanists and zoologists alike. Part I is introductory; Part II covers the chemistry of carbohydrates, fats, proteins and related compounds and enzyme processes; Part III is devoted to cell metabolism with a full discussion of the oxidative and synthetic mechanisms in various types of cells. An introductory chapter on the history and literature of biochemistry should be of particular interest to teachers.

Standard Values in Nutrition and Metabolism. Edited by ERRETT C. ALBRITTON. 380 pgs., 160 tables. W. B. Saunders Company, West Washington Square, Philadelphia 5, Pa. (1954) $6.50.

This is the second fascicle of a *Handbook of Biological Data* being prepared under the auspices of the AIBS and the National Research Council. Hundreds of specialists have been drawn upon for data and advice and every table has been checked several times by such authorities. Subjects include: Nutrients; nutrients utilized by animal forms, by plant forms; daily nutrient allowance; diets and culture media for animal forms, for plant forms; nutrient and energy value of foodstuffs and feedstuffs; signs of deficiency and excess; pathways of metabolism; end products of metabolism; O_2 production in animals, in plants; and energy exchange.

Textbook of Physiology. Edited by JOHN F. FULTON. 1275 pgs., 600 illus. W. B. Saunders Company, West Washington Square, Philadelphia 5, Pa. (17th edition, 1955) $13.50.

For fifty years this text has been a standard in many medical schools and physiology departments. Several of the thirty contributors have revised their chapters for this 17th edition; other sections, such as those on body fluids, kidney function and respiration have been completely rewritten. A new chapter on actylcholine and energy transformations in nerve cells has been added.

Marketing of Agricultural Products. RICHARD L. KOHLS. 399 pgs. The Macmillan Company, 60 Fifth Avenue, New York 11, N.Y. (1955) $5.25.

Biologists other than agriculturalists should find this book interesting extracurricular reading. The style is informative and the contents comprehensive. The approach is a mixed one—partly functional, partly institutional, and partly by commodities. For students, the author believes the subject should be presented in the framework of the familiar—hogs, milk, the retail store and so on. Hence, his mixed approach is intended to both make the subject "more palatable" and enhance the learning process.

Climatic Atlas of the United States. STEPHEN S. VISHER. 403 pgs., 1031 fig. Harvard University Press, Cambridge, Mass. (1954) $9.00.

This volume is the first book since 1941 on climates of the U.S. and the first attempt since 1921 to assemble under one cover the available maps on the climates of this country. The 1031 maps and diagrams are presented in 34 chapters grouped into seven parts. Five sections embrace the major elements of climate: temperature, wind, sunshine, humidity and precipitation, and the other two, some consequences of climate and weather, and climatic regions and climatic changes for more than 100 years. The author is Professor of Geography at Indiana University.

LABORATORY MANUALS

Laboratory Exercises in the Plant Kingdom. PAUL C. LEMON and N. H. RUSSELL. 121 pgs. Wm. C. Brown Company, Dubuque, Iowa. (1954) $2.50.

Laboratory Explorations in General Zoology. KARL A. STILES. 291 pgs. The Macmillan Company, 60 Fifth Avenue, New York 11, N.Y. (3rd edition, 1955) $3.75.

A Survey of Biological Abstracting

BENTLEY GLASS, *The Johns Hopkins University*

PART II

IN the previous part of this report a statistical study of certain aspects of the current abstracting situation was summarized. It seemed desirable from the beginning to accompany this study with an inquiry directed to biologists regarding their use of abstracting services, their judgment as to current merits and defects of the services used, and their opinions about the necessary and the desirable features of a good, if not ideal, abstracting service. After a careful examination of the questionnaire on physics abstracting prepared and sent out by Dr. Dwight E. Gray in 1949, a questionnaire was prepared for circulation to biologists.

Distribution of the questionnaire

To render the distribution as wide and as representative as possible, and yet to keep down expense, arrangements were made with the American Institute of Biological Sciences, the Federation of Experimental Biological Societies, the Society of American Bacteriologists, and the American Association of Economic Entomologists to use their mailing lists. There is relatively little overlapping between these groups, and together they cover a large proportion of all U. S. biologists.

From the A.I.B.S. mailing list of 14,583 names, including 17 societies, every third name was taken, a total of 4861. From the Federation list of 4000 names, including 6 societies, every fourth name was taken. From the 7677 persons on the list of the S.A.B., 594 were selected at random; and from the 3500 entomologists on the A.A.E.E. list, 350 were chosen from the United States, Alaska, Hawaii, and Canada, and all 150 of the foreign entomologists were added. The questionnaire was thus mailed to 6955 biologists. From the United States and Canada 1,854 returns were received, from abroad about 180—the latter a questionable number because no distinction was made between mailed and personally distributed questionnaires received from abroad. The proportion of returns to distributed questionnaires was therefore approximately 29%.

In the evaluation of opinion on the basis of questionnaires returned by mail a basic error is involved, because the returns mostly come from persons who are conscientious and deeply concerned about the issues presented. Those who are more neutral or indifferent in attitude commonly do not reply. Accordingly an effort was made to pick a few characteristic localities and to secure from them a real census of opinion by personally distributing the questionnaires to all the biologists in each locality and then following up until returns were secured. In this way the possible biases in the returns by mail could be evaluated. The three areas were (1) a metropolitan area including a university, two medical schools, a women's college, a Negro college, a Roman Catholic men's college, a state teachers' college, a research institution, a state health department, natural history society, hospitals, and business firms employing biologists; (2) two small liberal arts colleges in two small cities without extensive library facilities beyond those of the colleges themselves; (3) a fairly large agricultural and mechanical college in a small town. For reasons of expense and accessibility, Baltimore was chosen as the first, Gettysburg College and Franklin and Marshall College, respectively at Gettysburg and at Lancaster, Pennsylvania, as the second; and Oklahoma A. and M. College as the third. Acknowledgment is made for their assiduous efforts to complete these censuses to Dr. Wm. L. Straus, Jr. and Mr. Saul Herner, of the Johns Hopkins University, and Dr. Bryan P. Glass, of Oklahoma A. and M. College. Distribution of the questionnaires and tabulation of the replies was carried out by Suzanne S. Glass.

Questionnaires were also sent to 360 librarians whose work was thought to be related to biology. These names were selected from the Special Libraries Association Directory (1951). Returns were 44.5%. In the hope of securing returns from a fair-sized number of foreign biologists, questionnaires were distributed in Europe at the General Assembly of the International Union of Biological Societies and at the Ninth International Genetics Congress in the summer of 1953; but few returns from these were received in time to be included in the analysis. The total returns from foreign biologists amounted to 219.

It is of course of considerable importance to know whether the returns form a representative sample of U. S. biologists. The 1854 questionnaires were therefore classified into 53 fields and 10 types of institutions, and the 53 fields were then grouped into 12 areas within each of which the answers given appear to be uniform. These, and the proportions of persons answering in each, are given in Table 1.

TABLE 1

Distribution of biologists answering within Subject Areas

Biological Area	*Percentage*
General	6.9
Botanical	15.2
Agriculture, Forestry	6.9
Plant Physiology	5.3
Microbiology	8.8
Genetics, Cytology	9.4
Ecology	4.3
Biochemistry, Biophysics	7.9
Zoological	15.5
Animal Morphology, Embryology	4.2
Physiology (animal and human)	12.4
Medicine, Pathology	3.1

No precise way exists to compare these proportions with the actual numbers of biologists in different fields, for the latter are not known. However, a comparison was made with the proportions of society members, as published in the *AIBS Bull.* 1: 10 (1951), and with the tabulation of doctoral degrees awarded in the biological sciences (*AIBS Bull.* 2: 17. 1952). One may conclude from these comparisons that possibly plant physiology, and genetics and cytology, are somewhat over-represented in the returns, and that certainly forestry and agriculture, and possibly biochemistry and the zoological studies, are under-represented. On the whole, agreement is rather good.

The 10 categories of institutions were as follows: Unclassified; Colleges (general); Universities; Agricultural and Mechanical Colleges; Medical Schools; Government Medical Agencies; Government Agricultural and Conservation Agencies; Private Research Institutions; Individuals; Museums, etc.

Analysis of Replies

The first question asked whether the respondent made any use whatsoever of abstracts of the biological literature. The percentage of non-users was very low: 2% for U. S. biologists, 3% for the librarians, 4% for the foreign biologists. However, the returns from the three censuses showed a much higher percentage of non-users: 12% in Baltimore, 9% at Oklahoma A. and M., 9% at the two small colleges. This contrast makes sufficiently apparent the unreliability of accepting the returns by mail at face value, and the importance of having some check on the replies by a more thorough census of opinion. Evidently a large proportion of the non-users of abstracts took no interest in returning the questionnaire. Users of abstracts are probably not more than 90% of biologists. Nevertheless, an overwhelming majority of biologists do use abstracts to at least some extent.

Question 2: Respondents were asked to check which of various indexing and abstracting services were used by them, and to underline the one they used most. The five services most

generally used were *Biological Abstracts* (88%), *Chemical Abstracts* (51%), *Quarterly Cumulative Index Medicus* (31%), *Bibliography of Agriculture* (31%), and *Zoological Record* (22%). As may be seen, no other abstracting or indexing service approaches *Biol. Abstr.* closely in general use. The other general abstracting journals (*Berichte über die gesamte Biologie*, 9%; *Excerpta Medica*, 18%) are not widely used. The *Cumulative List of Medical Literature* (20%) consistently ranks below the *Quart. Cum. Ind. Med.* in use, and but slightly exceeds the use of *Excerpta Med. British Abstracts of Chemistry and Physiology* and the *Ber. ges. Biol.* have each a total of about 10% of users, although the latter is used more than that by foreign biologists (17%). *Psychological Abstracts* and the *Geological Indexes* are little used except by specialists in such fields as animal behavior or paleontology, respectively. A surprise is the high use (7%) made of the *Reviews of Applied Mycology*, which easily leads among the specialized biological abstracting journals, and is used by three times as many biologists as there were mycologists in the returns.

Ranked according to *chief* use by individuals, the order of the first five is the same: *Biol. Abstr.* (50%), *Chem. Abstr.* (22%), and the other three 5%, 4%, and 4% respectively. In the special localities, Baltimore biologists use *Chem. Abstr.* slightly more than *Biol. Abstr.*, and 22% of the Oklahoma A. and M. biologists use the *Bibliog. Agric.* as chief service, so that for them it ranks next after *Biol. Abstr.* (50%). In the remainder of the two tabulations, the rankings for each service, by *any* use and by *chief* use, are remarkably similar, except that *Brit. Abstr.* and the *Geol. Indexes* are much higher in use than in principal use, whereas the *Rev. Appl. Mycol.*, *Tropical Disease Bulletin*, *Wildlife Reviews*, and *Helminthological Abstracts* are not widely used but among their respective users rank high in chief use. When a simple preference index is calculated by dividing the amount of chief use by the total users, for each service respectively, *Biol. Abstr.* and the *Rev. Appl. Mycol.* rank highest, with over 30% of users making chief use of each respectively. *Chem. Abstr.*, the *Reviews of Applied Entomology*, *Trop. Disease Bull.*, *Wildlife Rev.*, and *Helminth. Abstr.* have an index over 20% in each case; *Geol. Indexes* one of only 4.3% and *Brit. Abstr.* of only 1%.

Certain differences in use become apparent when the U. S. biologists are classified according to type of institution. There was no difference between biologists in colleges and those in universities, but biologists in the agricultural schools report a heavy use of the *Bibliog. Agric.*; and those in the medical schools, hospitals and clinics, and government medical agencies a heavy use of the medical indexes and abstracts. *Chem. Abstr.* finds its heaviest use among biologists in medical schools, hospitals and clinics, government medical agencies, commercial laboratories, and private research institutions. Museums and similar institutions reveal a high use of *Zool. Rec.* The *Ber. ges. Biol.* finds 10% of users in the universities, government medical agencies, private research institutions, and among "individuals." The *Brit. Abstr.* attains 10% of users in universities, hospitals and clinics, government medical agencies, and private research institutions. Most striking, nonetheless, is the general reliance upon *Biol. Abstr.* Only in the medical schools, hospitals and clinics does the number of users drop as low as 70-75%. In the colleges and universities, agricultural colleges, government agricultural and conservation agencies, and museums, *Biol. Abstr.* is used by 90% or more of all users of biological abstracting services.

The agreement between the Oklahoma A. and M. survey and the returns by mail from all other A. and M. colleges is very close. The two small colleges surveyed also agreed closely with the returns from other colleges by mail. The Baltimore data do not agree precisely with any of the categories of institutions in the classification, but were intermediate between the returns from colleges and universities, on the one hand, and medical schools, on the other, in regard to the use made of most services; but in respect to the use of *Chem. Abstr.*, *Biol. Abstr.*, and the *Bibliog. Agric.* the Baltimore data more closely resembled those of the medical schools. This is quite in line with the known character of the Baltimore scientific community.

When the biologists are separated according to their major areas of work, *Biol. Abstr.* far outranks most other services in almost every area. Only in the field of Biochemistry and Biophysics is it clearly exceeded by the use of *Chem. Abstr.*; and in the fields of Medicine and Pathology by the use of the *Quart. Cum. Ind. Med. Chem. Abstr.* is also used heavily by workers in Plant Physiology, Microbiology, and Animal and Human Physiology. *Excerpta Med.* in all groups ranks in use below the *Quart. Cum. Ind. Med.* and mostly below the *Cum. List Med. Lit.* as well. The *Bibliog. Agric.* is used most by workers in Agriculture and Forestry but also by about half of those in Botany or Plant Physiology. Its use otherwise is moderate to negligible. The *Zool. Rec.* finds 67% of users in Zoology, is used by more than half those in Ecology, has fairly heavy use in General Biology, Genetics and Cytology, and Animal Morphology and Embryology; but is little used by workers in other fields. In general, the 12 fields show distinctive differences in the patterns of use of the abstracting and indexing services.

Question IV asked respondents to check (A) whether they used abstracts of the biological literature principally as a guide to finding original articles, principally as a substitute for original articles, or about half as a guide and half as a substitute; and (B) whether they used the abstracts principally to aid in keeping up with the literature, principally for reference, as in preparing bibliographies, or about half and half. The answers to Question A were very similar for all groups. The use of abstracts entirely as a substitute for the original literature is definitely unpopular (5%). Just under half (49%) replied that they used abstracts principally as a guide to finding original articles; somewhat fewer (46%), about half for that purpose and half as a substitute for original articles. Thus perhaps 20-25% of the total use of abstracts is in substitution for the original articles, which presumably are those difficult to obtain. In the case of Question B, 25% of users rely on abstracts chiefly to aid in keeping up with the literature, 30% principally for reference, and the remainder (45%) for both purposes. Biologists in hospitals and clinics lead in the use of abstracts for keeping up with the literature. From the distribution, it is apparent that the good abstracting service will have to meet both of these needs, although the indexing and reference function outweighs the informative function in importance.

Because of the clearly supreme importance of *Biol. Abstr.* among biological abstracting services, the next three questions related to users' opinions about the service rendered by it. Question VI asked respondents to check the performance of *Biol. Abstr.* as "satisfactory" or "unsatisfactory" in regard to breadth of coverage of articles of biological interest, adequacy of indexing, promptness of indexing, promptness of appearance of abstracts after original articles, grouping of abstracts in the journal, format and general readability, and over-all effectiveness as a biology abstract journal. A great majority (87%) of users evidently thinks coverage is satisfactory, and this applied equally to the special groups and categories of fields and institutions. This is quite surprising, in the light of the actual coverage both of the entire field of biological journals and of the articles in the journals listed as being covered (see Part I of this report). It is clear that users of this, as well as other, abstracting services have little idea of the extent of the gaps and omissions in the abstracting of the periodicals supposed to be covered, or of the vast majority of scientific periodicals with biological material that are not covered at all.

The adequacy of indexing was not rated quite as satisfactory as the adequacy of coverage. The average for all groups was 85% who voted satisfactory; but the Baltimore group and the librarians were less satisfied, and only 69% of the biochemists and 75% of the museum users felt that the indexing passed muster. As to promptness of indexing, the response was unequivocal, 59% voting unsatisfactory. This is not surprising, since in 1953, when the questionnaire was distributed, the indexes were 4 years behind. The proportion of "unsatisfactory" votes varied considerably according to fields of work and categories of institution. The physiologists (69%), plant physiologists (68%), biochemists (70%), microbiologists (70%), and geneticists (70%), museum users (70%), medical school workers (72%), and workers in private research institu-

tions (80%) were surpassed in condemnation by the Baltimore group (93%), the two small colleges (88%), and the librarians (85%). The foreign biologists and the A. and M. biologists seemed less concerned about the delay.

As to promptness of publication of the abstracts following issue of the original articles, a majority of users (54%) voted unsatisfactory, with somewhat the same variation in opinion as in the immediately preceding case. Actually, as the statistical analysis has shown (see Part I), the promptness of publication of abstracts is by no means poor. Probably users have confused the failure to abstract an article at all with a delay in publication. Actually, if an article is not abstracted within 1 or 1½ years, it will in most instances never be abstracted at all; but this will be put down to a delay in publication unless some systematic check is made over a period for which all abstracting has been concluded. In short, the respondents seem to have mistaken incomplete coverage for delay in publication of the abstracts.

Only 12% of the users voted unsatisfactory in respect to the grouping and arrangement of abstracts within *Biol. Abstr.* The format and readability were rated satisfactory by 95% of users. The over-all effectiveness of *Biol. Abstr.* was thought to be satisfactory by 88%. It must of course be pointed out that in the case of "satisfactory" votes, this does not mean that all respondents feel that no improvement is needed. Answering questionnaires is a highly subjective affair, and many persons clearly wanted to vote differently than by accepting either of the two alternatives provided. Some, indeed, wrote out their views in helpful detail. Yet in general, for purposes of statistical analysis, the simpler the choice offered the better; and two alternatives make for easier answering as well as easier tabulation than, say, four or five. The appearance of greater accuracy when a more elaborate scale is offered may be largely illusory.

Question VII related to the dependence of users upon personal in contrast to institutional copies of *Biol. Abstr.* About 10% reported dependence mainly on personal copies, and another 10% on personal copies in part. There is some variability from group to group, but in general 79% rely solely on institutional copies. The proportion seems to be the same among foreign biologists as in the United States. The comparison between returns from the A. and M. colleges by mail and the census of Oklahoma A. and M. biologists implies that there is probably a higher proportion of users who rely solely on institutional copies among the total biologists than among those who returned the questionnaire. Most biologists who afford personal subscriptions, in other words, were more conscientious about responding. Twenty per cent who depend upon personal copies is therefore a *maximum* estimate.

Question VIII A: Are you a member of a biological society that supports *Biol. Abstr.* by an annual grant? The percentage replying affirmatively was considerably higher among the mail returns (54%) than in the census localities (34%). This represents again a bias in the mailed-in returns. The percentage of foreign biologists responding affirmatively was 37%, a reflection of the fact that the great majority of foreign biologists who do not belong to a U. S. biological society are poorly represented in the returns. In general, between a third and a half of U. S. biologists belong to some society that subsidizes *Biol. Abstr.*

Question VIII B: If you subscribe to a section of *Biol. Abstr.*, do you think it worth its cost to you? There was a surprising diversity of opinion about this, the affirmative vote averaging 64%. 14% said "No" and 22% "Don't know." Geneticists and cytologists seemed most often convinced of the personal value of the sectional subscription to them (78%); biochemists and biophysicists (47%) and animal morphologists and embryologists (50%) least. Among institutions of different types, the range was from 89% among workers in hospitals and clinics down to 33% among workers in museums.

Question VIII C: If not a professional taxonomist, do you use the taxonomic sections of *Biol. Abstr.*? This question was included because of the need to find out how useful these sections are. Professional taxonomists, especially the zoological ones, have suggested that these sections be discontinued, inasmuch as *Zool. Rec.* is adequate for the purpose. The response was very consistent among the groups replying. Of a total of 1531 replies to this question, 32% said "Yes." Among the foreign biologists the proportion rose to 40%, which is perhaps as high a proportion as use any single section of the periodical. It seems a justifiable conclusion that even if no professional taxonomists themselves make use of the taxonomic sections of *Biol. Abstr.* (which is certainly not true), still enough use is made of these sections by other biologists to warrant their continuation.

What sort of biological abstracting journal is wanted?

The two final questions were intended to discover what items biologists might consider to be essential or preferable in an abstracting journal.

Question IX: Check if considered to be essential: Complete coverage of the selected journals; publication of abstracts within ½ year of appearance of original articles; within 1 year; within 1½ years; inclusion in each issue of an author index; inclusion in each issue of a full subject index. Nothing was said in regard to the practicability of these desiderata. Consistently about 80% from all groups wanted complete coverage of the selected journals, except the Baltimore biologists, among whom only 51% regarded this as essential. The triple alternative in regard to the promptness of publication of abstracts polled 60% for the ½-year interval as a maximum lag, 33% for the year interval, and only 2% for the 1½-year interval. From this vote one might conclude that domestic journals should certainly be abstracted within 6 months of issue, and foreign journals within 1 year—or else the users will rate the service as unsatisfactory. The inclusion of an author index in each issue was regarded as essential by 42%, with little variance except from the librarians, of whom 80% marked this essential. A full subject index in each issue was even more strongly favored (57%), with little variance between groups. 12% of the respondents wrote in other items they regarded as essential. It is significant that since this survey was made, *Biol. Abstr.* has inaugurated author indexes in each issue. The preparation of monthly subject indexes still lies beyond the potentialities of present staff and finances.

Question X A: The user was asked to select one of three alternative choices: (a) titles and references only (plus at most one indicative sentence about content), with very wide coverage of research and review journals; (b) reasonably informative abstracts (like those now appearing in *Biol. Abstr.*), with limited coverage; (c) titles and references for readily available publications and informative abstracts on the others. Only 12% voted for (a); 61% voted for (b), and 27% for (c). In the Baltimore group votes for (a) rose to 40%, and the librarians especially favored (c), but otherwise a nearly two-thirds majority wants to keep things as they are. The foreign biologists (69%) in particular want the informative abstracts.

Question X B: Two alternatives (a) a preference for prompter abstracting (0-6 mos.), using authors' abstracts in so far as possible; or (b) a preference for slower abstracting (6-12 mos.) by subject experts rather than authors, in so far as possible. This question was considered very important because of the strongly expressed distaste of *Chem. Abstr.* and most European biological abstracting journals for the use of author-prepared abstracts. The question was not designed to elicit an expression of preference for or against author-prepared abstracts as such, but to couple this with the question of promptness in abstracting. *If* author-prepared abstracts can be published more promptly, which are to be preferred? The answer was an overwhelming vote (76%) in favor of the author-abstracts if prompter publication would ensue. There was little variance in this response. The majority increased to 85% among the biological librarians and dropped to 67% among the foreign biologists; but no doubt can remain that biologists approve of the use of author-abstracts if that will mean greater promptness in publication of the abstracts.

Three special questions were asked of the biological librarians. (A) Should the abstracting program include books, annuals, monographs in series, important pamphlets, and the like? The

vote was about equally divided between the view that they should be abstracted (45%) and the view that they should only be listed (48%). (B) Should abstracts be arranged alphabetically by author or alphabetically by title, and in each case should this be throughout the issue, within each of a number of subject headings, under the headings of the source periodicals, or both? The librarians voted by an 89% majority in favor of arrangement alphabetically by author, and they exhibited an equally overwhelming preference for arrangement alphabetically within each of a number of subject headings (82%). (C) Seven points were suggested for inclusion. 65% voted that each entry should be numbered for indexing purposes; 80% that an author index in each issue is essential; 88% that the last issue of each volume should list the periodicals abstracted; 51% in favor of placing Union List symbols opposite rare titles to facilitate interlibrary loans; 49% that trade literature, Ph.D. theses, and various other ephemera should be included; and 44% that duplicate abstracts of biological papers also abstracted in other fields should be included; 9% added other items and suggestions.

Summary

In spite of its admitted defects, *Biol. Abstr.* is overwhelmingly the leading abstracting service for biologists. This appears to be true abroad as well as in the United States, although a larger and more random sample of foreign biologists is greatly needed to extend the present survey. Oddly, users of *Biol. Abstr.* in the great majority regard its coverage as satisfactory but express dissatisfaction with the promptness of appearance of the abstracts. This opinion can only arise from a gross misconception of the true state of affairs (see Part I). Overwhelming dissatisfaction is also expressed in regard to the promptness of indexing, which a program scheduling the completion of two subject indexes annually will by the end of 1955 have brought up to date. In other respects, most users agree that *Biol. Abstr.* is reasonably satisfactory. Few biologists rely exclusively on personal copies of *Biol. Abstr.* for use, but those who do subscribe to individual sections for the most part regard them as worth the cost. There is agreement that complete coverage of a selected list of journals, publication of abstracts within ½ year of the appearance of the original articles, and inclusion in each issue of a subject index are "essentials." To speed up the publication of abstracts, a very great majority of users approve of the use of author-prepared abstracts; but the publication of informative abstracts, with limited coverage, meets more favor than exclusive use of titles and references in order to secure the widest possible coverage.

Among other abstracting journals, only *Chem. Abstr.* is widely used by biologists, among whom probably about 10% make no use of abstracts at all. The other two general biological abstracting journals besides *Biol. Abstr.*, namely, *Excerpta Med.* and the *Berichte ges. Biol.*, are used relatively little, even abroad, to judge by this survey. The medical and agricultural indexes and bibliographies, *Zool. Rec.*, and the more specialized abstracting journals such as *Rev. Appl. Mycol.*, render an important service to certain specialized groups.

Recommendations

The following recommendations are personal views, put forward to elicit discussion and possibly initiate certain actions.

There are two general types of abstracting and indexing periodicals in respect to coverage: (1) the broad and general; and (2) the specialized, restricted to a relatively small arc of all biology. There seems to be a definite need for both of these kinds of service. Only the former can give the general user that breadth of information he needs, and only the latter can be exhaustive within its circumscribed area. Both types should therefore be encouraged and should supplement each other.

Improvement along four lines seems highly desirable:

(1) improvement in coverage of the biological literature;
(2) improvement in promptness of publication of abstracts following issue of the original articles;
(3) improvement in promptness of publication of indexes;
(4) improvement in the coordination of different abstracting services so as to reduce duplication of effort.

All of these apply to *Biol. Abstr.*, and in a considerable measure to the entire world program of biological abstracting.

Improvement in the promptness of publication of indexes is chiefly a financial problem, as the excellent progress of *Biol. Abstr.* in bringing its subject indexes up to date since receiving sufficient financial aid from the National Science Foundation and other government agencies makes clear. There will be no need to discuss this point further.

A World Abstracting Plan

The remaining recommendations, included in the original report of the Survey, have been modified and amplified into a general plan for coordinating and improving biological abstracting. This plan, as prepared for presentation to the General Assembly of the International Union of Biological Societies in Rome, April 11-16, 1955, is given below. It is to be taken as an expression of my personal views. B. G.

Improvement in the coverage of the biological literature involves both a completer coverage of those journals already on the lists of abstracted periodicals and an extension of those lists to make them all-inclusive. Because of the magnitude of the task, it is altogether beyond the resources of any single abstracting service. If no more than 14% of the 20,000 or more journals wholly or partly biological in content are substantive journals that publish reports of original research, that still amounts, according to an estimate by Dr. Raymund Zwemer of the Library of Congress, to 2800 important journals that ought to be fully covered in any truly comprehensive abstracting program. These journals, again according to Zwemer's estimate, publish on the average 72 articles annually. *Biol. Abstr.* is at present able to publish 30,000 abstracts annually, so that it might thus cover at most about 400 journals completely. It would take *seven* abstracting journals of the size of *Biol. Abstr.* to cope with the job. The obvious conclusions are (a) that the general abstracting journals must perforce be selective, and (b) that they ought to overlap just as little as possible. Coverage and the coordination of different abstracting services should therefore be considered together. These facts lead to a proposal of the following plan:

(1) Expert advice should be obtained and collated to determine which journals are most important to cover completely. Each service should select, say, 200 journals to form a nucleus of journals to be covered completely. Some advisory system should be set up to determine, within each field of biology, what journals not on the list ought to be added, and which ones might be dropped. As new journals are founded and old ones cease publication, the list would have to achieve a sort of steady state by continual revision of its list of covered journals. It seems imperative that the advisory system for this purpose be of an international character, since American biologists will know too little about the value of foreign language periodicals, particularly when these are relatively young.
(2) *Excerpta Medica, Biological Abstracts,* and the *Berichte* should adopt mutually exclusive "nuclei" so that collectively they would at least cover some 600 journals completely. By agreement, other general abstracting services that cover

biology in part, such as *Chemical Abstracts* and the *Geological Indexes*, might take smaller quotas of appropriate, partly biological journals to cover completely. In the selection of a nucleus, due consideration should be given to the particular character of an abstracting service. Thus *Biol. Abstr.* might by agreement concentrate on journals in the English language, *Excerpta Med.* on journals of medical interest, the *Berichte* on those in the Germanic and other European languages.

(3) A system should be worked out for recording all titles and references in the journals forming the nucleus to be covered completely, so that whenever no author-prepared or solicited abstract was forthcoming within a specified interval after issue of the original article, the citation would be automatically entered and indexed. Such articles would, though not abstracted, thus be saved for future reference work.

(4) Each cooperating service should provide the others with advance proofs or copies and should give mutual permission to reprint abstracts freely.

(5) The remainder of the annual quota of abstracts published by each service should be so selected as to give a broad and representative coverage of all areas of biology, and especially of the foreign literature difficult of access to the subscribers. This segment of the annual quota could be made up from (a) abstracts reprinted from the nuclei of the other general abstracting services, (b) selected abstracts reprinted from the specialized abstracting journals (see below), and (c) author-prepared or solicited abstracts selected to cover biology as broadly as possible, and in particular to fill the gaps between the areas covered by the specialized abstracting journals.

(6) Subsidizing agencies, both international ones such as UNESCO, ICSU, IUBS, CIOMS, and national ones such as the National Science Foundation, and individual biological societies, should make financial support contingent upon participation in the plan of cooperation.

In so far as author-prepared abstracts are used, the improvement in coverage and in promptness of publication of abstracts may also go together. A real effort should be made to widen the group of publications that supply author-prepared abstracts, for these journals in the main receive the best coverage and the promptest publication of abstracts of their articles. A general conference of biological editors ought to be held at which the problem could be presented to them—among many others which they might mutually discuss with profit—and the inadequacies of the present haphazard program of abstracting made clear. The responsibility of editors to their scientific public does not end with the publication of their own journals, but includes a duty to see that their own journal is properly abstracted and indexed for the widest possible general use. The responsibility of authors does not end with publication of their papers in a recognized journal, but likewise extends to the sphere of abstracting and indexing. Once they see the need, biologists will surely exert sufficient pressure to lead to the adoption of some uniform policy requiring the submission of an abstract or synopsis with every manuscript, just as some journals now require it. This problem is chiefly one of persuading scientists to do something for the sake of their own science. It is inconceivable that it can fail if properly and continuously presented to them.

The problem of the preparation of adequate abstracts needs to receive further consideration. Many abstracting services now reject author-prepared abstracts because, they say, authors cannot prepare good abstracts of their own papers. They do not know what is essential information and what is trivial; they let their biases run away with them; they emphasize what they hope their work adds up to instead of limiting themselves to really valid conclusions. This is often unfortunately only too true—yet who knows better than an author what is in his paper? And can the average abstractor be trusted to reach sounder conclusions than the author, who surely must have a greater familiarity with the original data? On the contrary, most abstracting services instruct their abstractors not to pass critical judgments but to limit themselves to a clear summary of essential data and conclusions. Can authors not be trained to do this too, even as they become trained to write acceptable papers? And should it not be the function of an editor to see that each author writes as good an abstract as the paper itself? It seems to me that this problem is clearly one of education rather than ability. When authors have had sufficient practice and guidance in writing abstracts, they can in general be expected to write acceptable ones. Of course, there will always be some who cannot or will not, just as there are still authors who send in for publication carelessly and ambiguously written papers. For these biologists, perhaps the discovery that their papers never get abstracted but are listed only by title will serve to bring about a change. There will be quite enough good abstracts anyway to fill our abstracting journals to overflowing.

Consideration must also be given to the specialized abstracting journals and how they fit into the general program. An extension of the plan for the general abstracting services will bring them into the scheme.

(1) As in the interchange between the general abstracting periodicals, there should be an exchange of advance proofs or copies between the specialized abstracting periodicals and the general ones, with mutual permission for free reprinting of abstracts or citations.

(2) In return for the saving of labor because of not having to abstract from the 600 or more major periodicals in the "nuclei" of the general abstracting periodicals, the specialized services could concentrate on the coverage of the more specialized and less accessible journals.

(3) By marking on the exchanged advance copies those abstracted articles likely to be of major interest to biologists outside of the respective specialties, the editors of the specialized abstracting services could indicate which abstracts might best be used by the broader services in making up their selection of abstracts to represent each special field. The general abstracting periodicals would thus need to survey and abstract chiefly in areas not represented among the specialized abstracting periodicals.

(4) As before, financial support from UNESCO, IUBS, ICSU, CIOMS, and other international agencies, or from national ones such as the National Science Foundation or the individual biological societies, should be contingent upon cooperation with the other abstracting services in the general program.

It is a most unfortunate fact that the UNESCO International Conference on Science Abstracting of 1949 and the vast amount of preliminary work done by the Coordinating Committee on Abstracting in the Medical and Biological Sciences has had virtually no effect. This must be attributed very largely to a hope that voluntary cooperation would develop; but it has failed to materialize. Considerable pressure must be exerted to make such a plan as that here proposed really work. In addition to the above points, it might be well to envisage also

(1) the adoption of those practices re synopses and forms of citation which were recommended in the Final Act of the International Conference on Science Abstracting; and

(2) the initiation of joint studies of needs and procedures.

PLEASE NOTE—The new A.I.B.S. address is **2000 P Street, N.W., Washington 6, D.C.**

John Simon Guggenheim Memorial Foundation

AMONG the many outstanding private foundations in the United States that biologists have grown to know and respect, the John Simon Guggenheim Memorial Foundation bears a particular distinction. A Guggenheim Fellow is referred to in much the same way as one speaks of a Phi Beta Kappa. A Guggenheim Fellow is a more mature, proven scholar who has been granted a Fellowship at a later point in his career, often at a time when his intellectual development can be best benefited by a year of special study or research, often away from his routine environment.

The Foundation was organized and incorporated in the State of New York in March 1925 by the late United States Senator Simon Guggenheim and Mrs. Guggenheim. The name embodied in the title of the Foundation is that of a son of the founders, who died in April 1922. The original endowment for the Foundation was in the form of securities amounting to approximately three million dollars. The Foundation's endowment is now approximately $33,000,000.

In the Letter of Gift, Senator Guggenheim stated, "It is Mrs. Guggenheim's and my desire, in memory of our son, through the agency of this Foundation, to add to the educational, literary, artistic and scientific power of this country, and also to provide for the cause of better international understanding. Our thought was that the income of the fund devoted to these purposes should be used to provide opportunities for both men and women to carry on advanced study in any field of knowledge, or in any of the fine arts, including music; and that systematic arrangements should be made to assure these opportunities under the freest possible conditions, and to make available for the public benefit the results of such studies. Believing as we do that such opportunities may be found in every country of the world, we purposely make no specification of locality, domestic or foreign, for the pursuit of these aims."

This freedom, originally outlined by the founder, has been one of the outstanding features of the Guggenheim Foundation program. Fellowships are awarded to both men and women who are of high intellectual and personal qualifications and have already demonstrated unusual capacity for productive scholarship or unusual creative ability in the fine arts. Fellowships in music are awarded only to composers of music and to scholars who propose research into the history or theory of music.

Fellows are usually of ages between thirty and forty years; but the Committee of Selection also is empowered to nominate persons older than forty and younger than thirty. The Fellowships are open to citizens, (or, in exceptional cases, to permanent residents who are not citizens) of the United States, irrespective of race, color or creed. The Foundation also offers Fellowships—to assist studies to be carried on in the United States—to citizens of all the other American Republics, of the Republic of the Philippines, of Canada and of the British Caribbean.

The average Fellowship is granted to further the development of the scholar or artist by assisting him to engage in research or creative activity in his special field. Grants are also made to a limited number of persons who need types of assistance other than those ordinarily comprehended with the term fellowship, to bring their intellectual and artistic capacities to still higher levels of quality.

The Committee of Selection seeks evidence that candidates are persons of unusual capacity for research, demonstrated ordinarily by their publications, or that they are persons of unusual and proved creative ability in one of the fine arts. Definite plans for their proposed study must be presented by all candidates. The Foundation consults with responsible scholars or artists regarding the ability and promise of the applicants and the value of the projects they propose.

Appointments are made ordinarily for one year; but plans which require longer or shorter periods also are considered. In normal cases a grant of $3000 is made for a year of twelve months. In general, the amount of the grant is adjusted to the needs of each Fellow, considering his other resources and the purpose and scope of his studies. Members of the teaching profession who have received sabbatical leave on full or part salary are still eligible for appointment. The Foundation may subsidize the publication of important contributions to knowledge produced by holders of Fellowships; but it does not guarantee to publish all works so produced.

Applications for fellowships must be made in writing on or before October 15 of each year, by the candidates themselves, in the form prescribed, addressed to Henry Allen Moe, Secretary General, John Simon Guggenheim Memorial Foundation, 551 Fifth Avenue, New York 17, New York. Final selection of Fellows is made each March. Fellows of the Foundation who seek renewals of their Fellowships must apply before February of each year. Suggestions concerning the form of presentation of such applications will be sent upon request.

In the 1951-52 annual report of the Secretary, Henry Allen Moe, several important attitudes and tenets of the Foundation were expressed. Dr. Moe wrote, "As an American institution, this Foundation always has insisted that nowhere, except in a free country such as ours, could an institution like this one operate at all; its existence would be impossible behind any freedom-stifling Curtain. . . . Just as we know that this Foundation could not function at all except in a free country, so also do we know that the principles of freedom, which we insist on for our Fellows are the necessary rights of all citizens." "We do not wish for our Fellows more freedom than we wish for all citizens. We know that no person can have a part in making our country strong unless he is a good citizen, devoted to the principles which are basic to our strength. . . . For workers in fields of all scholarships and the arts good citizenship means—among other things—that as scholars and artists they shall hold themselves free to go to the conclusion to which the facts and their own thinking take them. If they are members of any movement, organization or group which does their thinking for them or which indicates what their conclusions must be or ought to be, they are not free to follow their evidence and their own thinking; and they get no help from us." "No guidance has been offered by anybody toward a solution to the problem (of security) and we are on our own with respect to it, as we always have been. . . . We hope that we always will be able to get the facts to enable us clearly to distinguish disloyalty from unorthodoxy: we aim to walk a straight road—abhorring disloyalty and undismayed by unorthodoxy. There are no reserved areas of the mind and spirit into which scholars and artists, as all citizens, may not venture. There are no prescribed orthodoxies which they may not challenge, if they proceed within the law of the land."

Among the many biologists who have been recipients of Guggenheim Fellowships since 1925 are the following well-known names:

E. C. Abbe, Edgar Anderson, Daniel I. Arnon, L. R. Blinks, H. F. Blum, Dietrich Bodenstein, N. H. Boke, Damon Boynton, S. W. Britton, E. G. Butler, R. M. Cable, S. A. Cain, E. C. Cantino, Rachel L. Carson, Britton Chance, J. J. Christensen, R. E. Cleland, K. S. Cole, J. T. Curtis, Pierre Dansereau, P. J. Darlington, Jr., Ralph Emerson, K. Esau, A. S. Foster, D. R. Goddard, R. B. Goldschmidt, L. V. Heilbrunn, J. J. Hickey, C. L. Hubbs, C. L. Huskins, F. Harlan Lewis, C. C. Little, B. McClintock, C. E. Mickel, G. H. Mickey, D. E. Minnich, H. J. Muller, W. J. Nickerson, J. M. Oppenheimer, Marion Ownbey, G. F. Papenfuss, G. Pincus, F. A. Pitelka, K. P. Schmidt, T. C. Schneirla, Knut and Bodil Schmidt-Nielsen, L. Shanor, A. J. Sharp, R. C. Stebbins, C. Stern, H. W. Stunkard, K. V. Thimann, C. B. van Niel, E. K. Vaughan, C. A. Villee, P. Weatherwax, G. W. Wharton, T. G. Yunker and R. L. Zwemer.

Who Will Teach Our Future Scientists?

J. KENNETH DONAHUE, *Utica College, Utica, N.Y.*

SOME weeks ago I received a letter from my old "chief" under whose direction, nearly twenty years ago, I became a zoologist and learned the rudiments of physiological research. He mentioned in passing that out of the twenty nine Ph.D.'s he had turned out over a period of more than thirty-five years only two are now holding academic positions in which teaching plays a major role. I happen to be one of the minority. Of the other twenty-seven, most of whom I know personally, over half of them have held college or university teaching positions at one time or another. Now they are all in the employ of industrial research laboratories, government research laboratories, and the research departments of certain medical schools. One is a member of the Board of the National Research Council. All of us received graduate school education which prepared us for research careers but, equally important, gave us the comprehensive background essential for teaching at the college and university level. We dealt with ideas as well as techniques. Twenty-nine is a small figure but those of us who are close to the academic scene know that the fate of the twenty-nine typifies a national trend which will result in an accute shortage of first rate science teachers within the next ten to fifteen years.

Government and industry cannot reasonably be criticized for draining off large numbers of our best young Ph.D.'s in science. They, too, are caught up in the tremendously accelerated pace of science and technology and if trained scientific personnel is essential to their growth, as it most assuredly is, the demand for more and more trained scientists is to be expected. Also, if they find the most acceptable employees among the Ph.D.'s in chemistry, physics and biology, it is clear that they must and will bargain for them with the most potent of all persuaders—good wages.

In the years prior to 1935 the market for capable scientists showed none of its present diversity. The growth of industry based upon technological advance found little nourishment from a desperately sick economy and scientific research was largely confined to the universities. The young Ph.D. had no other thought than to get an instructorship in a good school and, by excellent teaching and imaginative research, make his way up the academic ladder to the full realization of his dreams, a professorship. The academic market was such that the supply of candidates for an opening always exceeded the demand and the best schools had the pick of the very best scientific brains coming out of the graduate schools. Indeed, at the depth of the depression in the first half of the 1930's places for new Ph.D.'s in the sciences were so scarce that those universities which could manage it, subsidized their jobless Ph.D.'s with research grants or assistantships to tide them over until a job came along. It is from this generation and that of the previous decade that the bulk of our present college and university science faculties has come. In the next 15 to 20 years they will be retired. Who will replace them?

In the face of a continuing expansion of research divisions in government and industry there will be increasing demands upon the colleges, and particularly the university graduate schools, for competent scientific personnel. In the present scramble for scientific manpower it is difficult to see how our schools of higher learning can attract the best teachers and researchers with the economic odds so much against them. In view of this ever-expanding demand for technically proficient manpower outside the universities, the preservation and continuance of a core of university teachers dedicated to the highest ideals of scholarship, teaching, and research becomes more essential than ever before.

Since the situation is entirely new it must be evident that something more than the obvious need for raising faculty salaries is required. The under-lying problem deals rather with the logic of continuing to force the universities into a dual role of training scholars on the one hand and technologists on the other. There is a fundamental difference between the two functions and the novelty of the situation will demand equally novel solutions.

It is pertinent to consider the possibility of developing two classes of scientists to meet current needs; the university teacher and the technologist. It is equally important that the present economic advantage held by industry and government be abolished so that those individuals naturally inclined towards teaching and basic research may make their choice freely and without the need of balancing the economic betterment in one field against the other. Since the progress of technology depends ultimately upon the free play of ideas which can only flourish in the atmosphere of the university, industry and government alike should play a practical part in the endowment of teaching and research chairs to keep that important ferment from ever going flat. The giving of student scholarships by industry is highly meritorious but is scarcely sufficient if done only for the purpose of providing more technological manpower. The status of American science bears much less of a relationship to the augmentation of scientific personnel in industry and government than to the high quality of those who teach in the colleges and universities.

So vitally important is the conservation and continuance of a scientific élite in our schools of higher learning that every alternative to the present heedless drain of potentially effective scholars and teachers must be studied. There can be no doubt that many industrial research and executive positions held by science Ph.D.'s require men of broad vision and highly developed technological knowledge. It is equally certain that many positions in government and industry demand a lesser degree of competence but are nevertheless filled by personnel whose education includes technological competence but a lot more besides.

Training schools for technologists would, on the one hand, spare the graduate Ph.D. for the work for which he is best fitted and at the same time provide for the needs of industry through well-planned training courses in technique. A college graduate not particularly interested in an academic career but wholly absorbed in science might be trained in a two-year course designed to achieve technological competence. It is also possible that university teachers and researchers might be subsidized over summer months and, in some cases during winter quarters to engage in the teaching of research techniques at the plants.

Not all scientists holding advanced degrees should be encouraged to teach. Many of them, because of an inability to communicate information easily and clearly, realize their fullest potentialities in institutional research. But for those with an aptitude for teaching and the ability to do independent research, far more effort must be exerted from every interested source to keep them in the colleges and universities where, as teachers and researchers in pure science, they alone will keep science, and the spirit of science, alive.

MEETING OF BIOLOGICAL SOCIETIES

Sponsored by

American Institute of Biological Sciences

MICHIGAN STATE COLLEGE

East Lansing, Michigan

September 5-9, 1955

INFORMATION ON HOUSING

DORMITORY ACCOMMODATIONS: College dormitories will be available for housing couples and families as well as single delegates. Accommodations will be available also in hotels and motels in and around the cities of Lansing and East Lansing. However, reservations for these accommodations will not be handled by MSC officials and arrangements must be made by individuals directly with the hotels and motels. Hotel-type accommodations are provided in the Kellogg Center on the MSC campus. These rooms, however, are limited in number and assignment will be made on a first-come first-served basis. Reservations may be made through Mr. J. D. Jackson whose address appears below.

DORMITORY ROOMS MAY BE OCCUPIED: Any time from noon on Monday, Sept. 5 until 10:00 a.m. Friday, Sept. 9.

PRE- AND POST-MEETING HOUSING: Arrangements should be made individually by delegates through Mr. J. D. Jackson whose address appears below.

RESERVATIONS: Dormitories and Kellogg Center—May be made from now until Sept. 2. Payment is to be made at time of registration on MSC campus.

RATES: Per person in *dormitories* (two persons assigned to a room), $3.00 per person the first night and $2.00 per person each additional night, with a maximum charge of $12.00 per week per person.

Per person in *Kellogg Center* (two persons assigned to a room), $3.50 per person per night.

ACKNOWLEDGMENT: Each advance reservation received before August 27 will be acknowledged by a form which should be presented at the registration desk in September. **Registration will be in the Main Lobby of the MSC Student Union.**

MEALS: Those staying in regular dormitories will take their meals in their "home" dormitory cafeterias. The cost will be $3.50 per day, payable in advance at time of registration. The cost of a missed cafeteria meal may be applied toward the cost of a banquet *if* arrangements are made during the registration period at a special "exchange" desk which will be provided for this purpose.

Those not wishing to take advantage of this "package" rate for meals may be served in the MSC Student Union Cafeteria on a direct cost per meal basis. However, each person making this choice should bear in mind two facts:

1. All delegates who select the individual, or "non-package" payment plan for their meals must be assigned to special dormitories set aside for this purpose.

2. The cost of meals on an individual basis will be higher.

Delegates will pay for and receive banquet tickets at registration.

TO MAKE ADVANCED REGISTRATION: Please fill out the registration form and mail to:

J. D. Jackson, AIBS,
Continuing Education Service,
Michigan State College,
East Lansing, Michigan.

TO FACILITATE ASSIGNMENT OF ROOMS: Those wishing to room together are requested to indicate this on the housing application form or on a note attached to the housing application form.

(PLEASE TYPE OR PRINT ALL INFORMATION)

REGISTRATION AND HOUSING APPLICATION—MSC MEETING

Name ..... (FIRST) ..... (MIDDLE) ..... (SURNAME)

Male ☐ Female ☐

Home Address: ..... (STREET)

..... (CITY) ..... (ZONE) ..... (STATE)

Expected Time of Arrival: ..... (DATE, HOUR)

Departure: ..... (DATE, HOUR)

Full Names, Sex, Relationship of Members of My Party:

.....

.....

.....

Arrival: By Train ☐
By Plane ☐
By Car ☐

Professional Address: .....

Title: .....

Institution: .....

Society Membership:

(1) .....

(2) .....

(3) .....

Please make reservations for me (and my party) in:

Dormitories with meals: (package rate) ☐

Dormitories without meals: (non-package rate) ☐

Kellogg Center: ☐

Remarks: .....

.....

SOCIETIES
Membership
100
200
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1900
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Amer. Assoc. of Anatomists
Amer. Beyological Society
Amer. Dairy Science Association
Amer. Fern Society
Amer. Genetics Association
Amer. Microscopical Society
Amer. Physiological Society
Amer. Phytopathological Society
Amer. Soc. for Horticultural Science
Amer. Soc. of Agronomy
2630
Amer. Soc. of Animal Production
Amer. Soc. of Limnology & Oceanography
Amer. Soc. of Ichthyologists & Herpetologists
Amer. Soc. of Human Genetics
Amer. Soc. of Plant Taxonomists
Amer. Soc. of Plant Physiologists
Amer. Soc. of Parasitologists
Amer. Soc. of Mammologists
Amer. Soc. of Naturalists
Amer. Soc. of Zoologists
Botanical Society of America
Biometric Society (ENAR)
Ecological Society of America
Entomological Society of America
2925
Genetics Society of America
Mycological Society of America
Phycological Society of America
Poultry Science Association
Soc. of General Physiologists
Soc. for Industrial Microbiology
Soc. for Study of Development & Growth
Soc. for Study of Evolution
Soc. of Protozoologists
Soc. of Systematic Zoologists
Nat. Assoc. of Biology Teachers
Soil Science Society of America
Wildlife Society
2000
American Ornithologists' Union
3200
Soc. of American Bacteriologists
5141
Soc. of American Foresters
10,000
Amer. Assoc. of Immunologists
Amer. Institute of Nutrition
Amer. Soc. for Experimental Pathology
Amer. Soc. of Pharm. & Exper. Therapeutics
Amer. Soc. of Biological Chemists
Dues
$1
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$5
$6
$7
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$15

Jackson Hole Biological Research Station

L. FLOYD CLARKE, *Director*

THE Jackson Hole Biological Research Station is administered by the University of Wyoming under agreement with the New York Zoological Society. It is designed to accommodate research workers in those particular biological fields for which the Jackson Hole area furnishes opportunity for substantial and significant research. The Station is located in a grove of lodgepole pines adjacent to the Snake River one mile east of the Jackson Lake dam, 33 miles north of Jackson, Wyoming, and 20 miles south of south entrance to Yellowstone National Park. This area lies within the Teton National Park. The areas surrounding the Station consist of grasslands, coniferous forests, willows and marshy areas. Opportunities are available for the study of animal and plant communities at altitudes ranging from 6,000 feet in the valley to 13,000 feet in the Teton Mountain Range in which the famous Grand Teton Mountains is located.

The Station buildings are of log construction and include a well-equipped laboratory plus seven dwelling units provided with light housekeeping facilities. A small fee is charged for use of living accommodations; no mess accommodations are provided. A library provided with the most essential biological references, an herbarium, and a collection of mammals and birds and a shop are available for the use of research workers. A boat with outboard motor, a pickup truck and passenger car are among the items of equipment available. Electricity, heat, refrigeration and telephone are provided at the Station.

Research workers at the Station may register for credit at the University of Wyoming. Grants for research have been supplied in some cases by the New York Zoological Society and in others by home institutions or other agencies.

Research Activities

The research programs of the Station have been undertaken to utilize the unique characteristics of the region. The cooperation that exists with biologists of Teton National Park, Yellowstone National Park, and the Forest Service is of great assistance in carrying out research projects at the Station. Studies have included significant research in (1) behavior of big game species of mammals and birds, (2) taxonomy of both plants and animals in the area, (3) ecological studies covering a wide variety of different habitats and different species of animals and plants, (4) parasites of many species of birds, mammals and fishes, (5) life history studies, (6) population studies of small mammals, birds and Drosophila, (7) predation, (8) laboratory studies in experimental embryology and physiology, and others. A total of 74 project numbers have been assigned to research programs undertaken at the Station since its opening in 1947. As examples of some of these research activities, the following might be mentioned.

Extensive behavior studies have been undertaken on the elk by Margaret Altmann, Hampton Institute, and on the moose by R. H. Denniston, University of Wyoming. In a study of the plants of the Jackson Hole area John F. Reed of the University of Wyoming described and compared the various plant communities within the area and studied the taxonomy, occurrence and abundance of the various species of vascular plants. Among the ecological studies are those of John T. Emlen, University of Wisconsin on the nesting rhythm and social behavior of cliff swallows; a correlated study by Arnold Petersen, St. Olaf's College, on breeding and flocking behavior including parental care of cliff swallows; and a comparative ecological study by George W. Salt, University of California, on the avifaunal structure of the Teton mountains.

In the field of parasitology Jack D. Tiner, Rutgers University, studied the effect of Ascarid larvae in the brain of rodents.

The studies of Warren P. Spencer, Wooster College, and others, on the Drosophila of Jackson Hole, together with more recent investigations by Dwight D. Miller, University of Nebraska, have contributed much to our knowledge of the ecology, genetics and evolution of this important genus. The research of John and Frank Craighead on the ecology of raptor predation, coyote evaluation, and nesting studies on Canada geese was an important contribution.

A list of Station publications will be provided on request. The policy of the Station is to cooperate on a mutually advantageous basis with all interested colleges, universities, societies, foundations, museums, government agencies and other groups and individuals interested in biological research.

Research Opportunities

A wide variety of biotic communities occurs within reasonable working distance from the Research Station. These include sagebrush, mountain grasslands; streamside communities, such as willows, cottonwoods and marshes; coniferous forest of several kinds; aspens, and alpine communities. Since the composition of most of these communities has not been studied the opportunities for general ecological studies are practically unlimited. Such studies could be purely qualitative in nature or they could be quantitative in scope and involve studies of population dynamics.

An extensive area to the north of the Station has been designated by the U.S. Forest Service as the Teton Wilderness Area. This area affords undisturbed conditions since the grazing of domestic stock and the cutting of timber is not permitted. Within this wilderness area are several large tracts of forest (1,000 to 11,000 acres each) which have been burned at different times in the past and form ideal areas for succession studies.

The area surrounding the Station is big game country with bighorn sheep, moose, elk and deer, as well as many species of fur-bearing animals. The U.S. Forest Service and the Wyoming Game and Fish Department have built a number of exclosures which can be used as control areas in making studies of the effects of both domestic livestock and wildlife on the ranges.

Other studies which could be made include general life history studies of particular species of either invertebrate or vertebrate animals; altitudinal and seasonal distribution studies; studies of behavior, territories and social organizations; studies of reproduction and growth; and both plant and animal taxonomy.

The region offers an abundance of research opportunities in the field of aquatic biology. Rocky Mountain lakes, particularly alpine lakes, present many limnological problems in need of intensive and long term study. In the area of the Research Station is found a wide variety of lakes which lie at elevations ranging from 6,000 to over 13,000 feet. Many aspects of stream ecology, a subject which has long been neglected in the field of hydrobiology, can be studied, literally, at the front door of the main laboratory. The Snake River, the largest stream in the area, runs right by the research area. Medium sized streams are convenient for study as well as smaller creeks and brooks.

Students of fishes and fisheries will find a wealth of research opportunities in the area. The life histories of most of the non-game fishes of the area are virtually unknown and many aspects of the ecology of the native game fishes are very much in need of long-term investigations. Fisheries management in the lakes and streams, here as elsewhere, presents its problems, and many aspects of fish production and management are in need of further study. Age-growth studies, yield and rates of exploitation, and population estimates are some practical problems in need of study as well as such factors as spawning habits and success, inter- and intra-specific competition and basic food and space requirements.

The facilities at the Research Station are satisfactory for laboratory study in physiology and development which can be correlated with field ecological and life history studies.

Requests for additional information concerning the Research Station should be addressed to L. Floyd Clarke, Department of Zoology, University of Wyoming, Laramie, Wyoming.

The Oceanographic Institute of Florida State University

SAMUEL L. MEYER, *Director,* and **ROBERT H. WILLIAMS,** *Professor of Marine Science*

THE Oceanographic Institute of The Florida State University was established in 1949 as a department in the College of Arts and Science. Its major objectives are: (1) to provide facilities for the training of students in marine science, especially at the graduate level; (2) to provide facilities for research in marine science by staff members, graduate students, and visiting investigators; (3) to conduct fundamental research in the northeast Gulf of Mexico area; and (4) to carry on applied research related to the fishery industry of Florida and the development of other marine resources.

The staff is composed of 4 full-time members who constitute the administrative personnel, representatives of participating departments which have marine interest, an electronics engineer, the resident superintendent of the Alligator Harbor Laboratory, a secretary, and graduate and undergraduate assistants. The administrative personnel includes: Samuel L. Meyer, Director; Robt. J. Williams, Prof. of Marine Science; Franklyn C. W. Olson, Assoc. Prof. of Oceanography; and R. Winston Menzel, Ass't. Prof. of Marine Science. Staff members, representing the participating departments, are: Werner A. Baum, Meteorology; L. M. Beidler, Physiology; Harrison V. Chase, Geography; M. S. Colberg, Economics; Karl Dittmer, Chemistry; L. C. Ellias, Bacteriology; Earl Frieden, Chemistry; R. K. Godfrey, Botany; M. Noka Hood, Bacteriology; W. N. Kellogg, Psychology; Herman Kurz, Botany; J. E. Leffler, Chemistry; J. H. McMurry, Geography; C. B. Metz, Zoology; R. B. Short, Zoology; L. D. Toulmin, Geology; B. M. Watts, Food and Nutrition; S. S. Winters, Geology; R. W. Yerger, Zoology.

Beginning in the fall of 1955, staff officers, laboratories, cubicles for graduate students, and storage space will be provided in the new air-conditioned building now under construction on the main campus of the University of Tallahassee.

The Gulf coast facilities are located on a 25-acre site on the harbor side of the peninsula that forms Alligator Harbor, about 45 miles south of Tallahassee. Alligator Harbor provides excellent shelter for small boats and offers the best bay collecting to be found in the region. The Gulf of Mexico is but five minutes walk from the Laboratory across the peninsula and the open Gulf is reached by a thirty-minute boat trip around the end of the peninsula.

The proximity of the Alligator Harbor Laboratory to the main campus offers the advantage of course work with weekly field trips to the laboratory and the Gulf throughout the year.

There are four principal buildings at Alligator Harbor. The laboratory building is divided into two major areas: one for class use is equipped with laboratory tables, tanks supplied with running sea water, a refrigerator, extensive shelf and cabinet storage space and an adjoining storeroom; the other, and larger, portion is divided into research cubicles for use of the staff and graduate students engaged in marine research. Adjacent to the cubicles is a utility area with tanks supplied with running sea water, a large freezer, an incubator, ovens, and an autoclave.

Outside the laboratory are large concrete sea water tanks for keeping marine animals. Sea water for the tanks both inside and outside the laboratory has a salinity of 28-31 parts per thousand. A large pool, constructed in 1954 for maintaining porpoises, is 70 by 50 ft. and about 7 ft. deep at high tide.

Adjacent to the laboratory is a residence building that provides comfortable living quarters and cooking facilities for investigators.

The Oceanographic Institute (FSU) with Alligator Harbor in the foreground and the Gulf of Mexico in the background.

The boathouse-shop is equipped with a variety of power and hand tools including welding, soldering, and woodworking equipment used for the fabrication of apparatus used in research and for the repair and maintenance of boats. A 300-foot concrete pier provides docking facilities for small boats and an instrument shelter for a tide guage and weather instruments.

Five power boats, ranging from 22 to 38 ft., and several skiffs with outboard motors are maintained for collecting in the Harbor and Gulf.

A station at Mayport, on the St. John's River near Jacksonville, provides additional facilities for visiting investigators, a location for fisheries research, especially in the menhaden and shrimp industries of the area, and an Atlantic coast laboratory for investigators interested in oceanographic problems of the Gulf Stream and the mouth of the St. John's River.

Laboratory space and living accommodations are also available on Mullet Key at the mouth of Tampa Bay. This station is favorably located for studies of the "Red Tide" and is surrounded by areas of abundant and varied marine flora and fauna.

Alligator Harbor is a shallow bay about 4 miles long and one to one and one-half miles wide. No freshwater streams enter the bay. Its depth hardly exceeds 6 ft. at mean low tide with the exception of a basin about one-half mile west of the pier where the depth is about 20 ft. at the center.

A major portion of the bottom of Alligator Harbor is covered with three species of marine flowering plants: *Thalassia testudinum* (turtle grass), *Syringodium filiforme* (manatee grass), and *Diplanthera wrightii* (narrow eel grass). More than 65 species of marine algae have been recorded from the Harbor since construction of the Laboratory began. The Harbor is also an excellent collecting area for marine animals. Some, such as sand dollars *(Mellita quinquiesperforata)*, sea pansies *(Renilla mulleri)*, both solitary-gregarious and colonial ascidians, hermit crabs *(Pagurus* and *Clibanarius)*, several sponges and brittle stars are present in abundance. Oysters and bay scallops are fished commercially in the Harbor. Shrimp *(Penaeus duorarum)* are seasonal in abundance. More than 150 species of molluscs have been identified from the Harbor. The vertebrate population is unusually diverse and dense for a shallow bay. Sharks, sting rays, and bottle-nosed dolphin are abundant. Among the teleosts, mullet, marine trout and pin fish are the dominants. The site of the Laboratory is near a variety of Gulf habitats of unusual ecological and hydrographic interest. These include the limestone outcroppings at a depth of 12-20 ft. in clear water southeast of the lighthouse at St. Marks and the Ochlockonee River and its long, bay-like estuary which provides a gradual transition from Gulf water to fresh water.

The basic philosophy of the program in oceanography at Florida State University adheres to the concept that the marine scientist should be thoroughly qualified in one of the basic scientific disciplines; biology, geology, physics, chemistry, or meteorology. For that reason, no undergraduate major in marine science is offered. The undergraduate student is expected to arrange his courses within the framework provided in the usual fields of available majors in the natural sciences. Upon this broad and fundamental undergraduate training can be superposed the specialization in oceanography at the graduate level. In the Graduate School degrees of M.S. with a major in physical oceanography and of M.S. and Ph.D. with a major in biological oceanography are available.

The research program conducted by the staff and graduate students is planned to balance fundamental investigations of the various aspects of the productivity of tropical continental shelf waters in the northeastern Gulf of Mexico with applied research in practical problems of the commercial and sport fisheries and the utilization of other marine resources. The staff subscribes to the philosophy that significant advances in the knowledge of the sea usually result from coordinated research by several specialists in the various marine sciences. Accordingly, the long-range projects are planned by a group of the staff members and the results of the individual investigations are integrated and published jointly. The effective solution of many of the practical problems will utilize the results of these fundamental investigations.

Duke University Marine Laboratory

CAZLYN G. BOOKHOUT, *Director*

THE Duke University Marine Laboratory is open throughout the year for research, and offers advanced courses in marine biology in the summer. It is located at Beaufort, N.C., approximately midway between Woods Hole, Mass. and Miami, Florida. It is a strategic spot for biological research because of the richness of its flora and fauna, and the ease with which one may reach a variety of habitats.

The biota of the Beaufort region has become well known through the work of prominent naturalists for the past century. Among those who carried on investigations from 1860-1938 may be mentioned Wm. Stimpson, Louis Agassiz, A. E. Verrill, W. K. Brooks, E. A. Anderews, H. V. Wilson, Caswell Graves, R. E. Coker, S. O. Mast, W. D. Hoyt, W. P. Hay and A. S. Pearse.

The Laboratory was established in 1938 by Dr. A. S. Pearse, its first director, as a place for students to receive training in marine biology. Investigators from 1938-1949 worked in the classroom laboratory, but demand developed for more adequate facilities, and in 1949 a research laboratory was built, and another was added in 1954. From 1938-1953, 72 papers were published as a result of work done wholly or in part at the Duke Station. Thirteen of these appeared in 1953.

The present plant consists of ten buildings including three dormitories, dining hall, residence, a classroom laboratory and two research laboratories. Thirty-six people may be accommodated in the dormitories. Rooms and apartments may also be obtained in Beaufort at reasonable rates. The dining hall is managed by an experienced dietitian, and the kitchen is provided with modern equipment.

The laboratories are supplied with salt water through a non-metallic hard rubber system. Equipment, chemicals and glassware are available for general laboratory procedures, but an investigator is expected to bring his own microscope and other special equipment. A darkroom, small library with reference books and reprints, and a small herbarium of marine algae and local flora are also maintained.

The station owns a 38 ft. power boat equipped to trawl and dredge in the sounds and in the ocean. A 27 ft. Higgins lifeboat, rowboats, and collecting gear are also available.

The Duke University Marine Laboratory occupies 13 acres of the southern portion of Pivers Island across the Newport River from the historic town of Beaufort. The U.S. Fish and Wildlife Laboratory occupies the remainder of the island. Beaufort is on the south side of the peninsula, and is approximately one mile and a half inside Beaufort Inlet, which separates Shackleford and Bogue Banks, two of the chain of sandy islands extending along the North Carolina coast separating the ocean on one side from a system of sounds on the other.

The open sea, Bogue and Core Sounds, Harker's Island, rivers, creeks, canals, mud flats, sand beaches, dunes, marshes, peat bogs, cypress swamps, bird islands and rookeries, coastal pine forest, and other habitats of biological interest are all within easy reach of the laboratory by boat or automobile.

The Gulf Stream is 35 miles offshore. Winds frequently bring the Portuguese Man-of-War, the rhizostomatous medusa *(Stomolophus)*, sargassum with its associated fish, shrimp, crabs and hydroids, and siphonophores of more southern waters close to shore in large numbers.

The sea bottom outside the inlet within five or six miles from the outer banks is sandy for the most part, but there are some areas of sticky mud. The slope is gradual, less than 60 ft. deep within a radius of 5 miles. Among the most common animals obtained by trawling offshore are three species of edible shrimp, two species of spider crabs, calico crab, two varieties of lady crabs, box crabs, portunid crabs, mantis shrimp, three genera of starfish, sand dollars, conchs, squid, sea pansy, croaker, filefish, Northern kingfish, butterfly ray, and sea robbin.

In the sounds miles of sand flats are inundated at high tide, but partly exposed at low tide; thus the collector may work with a minimum of effort. They support a rich polychaete fauna, numerous species of clams and snails including three

species of Busycon, nemerteans, sand dollars in great abundance, some heart urchins, several species of hermit crabs, burrowing crustacea, king crab, and the hemichordates, *Balanoglossus* and *Saccoglossus*.

Wharf piles and stone jetties are within rowing distance from the station and offer additional collecting sites. In fact, Stephenson and Stephenson (1952) found 105 common forms on the breakwaters of Beaufort as against 37 and 34 for Marineland, Fla. and Charleston, S.C. They concluded, "these numbers represent, of course, only an indicative fraction of the total present, but confirm our impression that the Beaufort population is normal, rich and varied." Although small numbers of Arbacia may be obtained from most any breakwater or piling in the harbor, quantities of two species of sea urchins, *Arbacia punctulata* and *Lytechinus echinatus*, may be obtained by dredging.

Since H. L. Blomquist introduced a course in Marine Algae at the Laboratory, there has been continuous interest and research on the flora of the area. As a result of the taxonomic work of Humm, Blomquist, and Williams 239 species and varieties of marine algae are now known to Beaufort. Recently, complete studies have been made of the diatoms of the Beaufort area by Dr. Jethro Manly of Duke University and Dr. Hustedt of Germany. Hustedt's work is now in press and will include a description of 399 species. Dr. Manly's study includes 542 species.

Visiting investigators may obtain space in the Laboratory during the summer or at any time throughout the year. Twenty-four investigators can be accommodated. Each reseach laboratory is divided into cubicles of sufficient size for one or two research workers. Since the new laboratory has been completed there is more ample space for biologists who need to use a large amount of equipment. Requests for space should be submitted to the director before April 1.

Recent and current research conducted wholly or in part at the laboratory includes the following studies: *Cytology:* germ cells of the diamond-back turtle. *Ecology:* ecological studies on spiders of maritime communities; drift-line animals; bryozoa; crabs; fish and birds. *Embryology:* development and growth of polychaetes, barnacles, and shrimp reared in the laboratory; hybridization in Arbacia and Lytechinus eggs. *Ichthyology:* life histories of North Carolina marine fishes. *Marine Algae:* taxonomy and reproduction of marine algae; and taxonomy of diatoms. *Parasitology:* survey of the parasites of the region; trematode life cycles and respiration in trematodes. *Physiology:* experimental studies on shell deposition in molluscs using tracer techniques; cell division studies on marine eggs; temperature effects on crab respiration; kidney function in mullet; and turnover of phosphorus compounds in fertilized Arbacia and Lytechinus eggs. *Protozoology:* encystment studies of protozoa.

All courses offered at the laboratory are given on the senior-graduate level and carry 6 semester hours credit. It has been the custom to offer three basic courses each summer, such as Marine Ecology, Marine Invertebrate Zoology and either Marine Algae or Coastal Aquatic Vegetation. These courses are given by staff members from Duke University. To broaden the program and to allow returning students some variety, the fourth course has been given by persons from other institutions. Under this plan Quantitative Biology was given in 1950, Biology of Populations in 1951, Bio-hydraulics in 1952, Oceanography in 1953, and Radiation Biology in 1954. During the summer of 1955 Radiation Biology and Marine Invertebrate Zoology will probably be given during the first six weeks of the summer and Marine Algae and Marine Ecology will be offered during the second term. Each course is limited to 20 students.

Scholarships for course work or research are available for predoctoral candidates, and four $500 postdoctoral research scholarships are granted annually to college faculty members from the southeastern United States.

A bulletin of the station and application blanks for courses or scholarships may be obtained by writing to Dr. C. G. Bookhout, Dept. of Zoology, Duke University, Durham, N.C.

Laboratory of Hydrobiology, University of Wisconsin

ARTHUR D. HASLER, *Department of Zoology*

As diversified farming typifies Wisconsin agriculture so diversified hydrobiology characterizes the research at this laboratory. Situated on the shores of Lake Mendota in the campus area of the University, it has become the center of activity for work in animal migration, the physiology, orientation, competition, and population dynamics of fish, artificial fertilization of lakes and nutrient requirements of algae.

From the beginning of limnological investigation on Lake Mendota chemists, physicists and bacteriologists have been invited to participate in the research projects. Today the Graduate School's tradition of liberalized majors and minors allows students in zoology and botany to choose minors in such departments as physiology (School of Medicine), biochemistry, entomology, bacteriology, veterinary science, genetics (School of Agriculture), statistics (School of Letters and Science) and sanitary engineering (School of Engineering).

In recent years fishery science has been emphasized by the zoologists engaged in research at the laboratory. Investigations have been made into the sense of smell in fishes and its relation to the ability of fish to find their way about their often opaque environment. A theory has been proposed by the author explaining the extraordinary homing habits of the salmon. Substantiating this theory are experiments showing that salmon recognize different streams by their odors, which are organic in nature. Young fish are known to retain their odor training for longer periods than older fish. Further collaborative evidence has been obtained by experiments on adult salmon in the state of Washington, where it was shown that displaced adult salmon do not return to parent streams if their "noses" are plugged. Laboratory and field experiments have yielded considerable supporting evidence that odor recognition is one of the principal mechanisms of orientation in fishes. Experiments are underway at the present time to determine whether salmon, conditioned to an artificial odor in a hatchery, can be decoyed to another tributary by dripping the same chemical into this water. Many aspects of orientation remain to be investigated and students and staff are continuing to plan experiments that will answer many of the remaining questions.

A recent addition to the laboratory will now permit the expansion of experimental studies requiring aquarium space. New facilities have aquaria utilizing cold or tempered deep well or lake water. Research on the endocrinology of fish will now be re-opened with the cooperation of Professor R. K. Myer (Zoology). Induced spawning in a number of species of fish has been achieved through the injection of pituitary glands and a micro-assay for this gonadotropic hormone has been devised.

Studies of fish movements in Lake Mendota have been made possible through the use of a Navy-loaned launch equipped with sonar gear. This echo-sounding equipment enabled hydrobiologists to locate fish during their daily migrations. Their

disappearance at dark remained a puzzle until students diving with aqua-lungs discovered that Lake Mendota perch were quiescent in a form of "sleep" at night on shallow shelves near shore.

A rapid sampling, rolling gill-net has been developed and, augmented with studies of water currents, is giving a new approach to the factors in the water which may be correlated with concentrations of fishes. This development was possible through the cooperation of Professor Reid Bryson (Meteorology). Earlier studies by Professor Bryson and Professor John Neess (Zoology) and their students demonstrated that currents are responsible for the non-random distribution of the zoo- and phytoplankton. Their finding will be helpful in re-examining production and standing crops of these organisms.

A concentrated attack is being made in the taxonomy, physiology and ecology of algae and aquatic plants by members of the departments of Botany and Sanitary Engineering. A well-equipped and new laboratory houses an active group led by Professor Gerald Gerloff and Folke Skoog, who are investigating the nutritive requirements of blue-green algae. Their studies have recently uncovered a new and effective chemical, dichlornapthoquinone, which promises to replace copper sulphate in controlling nuisance scums of lake algae. Professor Gerald Rohlich (Engineering) and his associates are adding to the knowledge of the budget of total nutrients entering and leaving Lake Mendota from the surrounding watershed. Ecologists are finding these basic data most useful. The taxonomy of aquatic plants has been advanced particularly by the late Professor Norman Fassett and his students, and by Professor John T. Curtis, whose students have provided new methods of sampling plant communities and systematizing their community interrelationships.

University of Wisconsin's Hydrobiology Laboratory (brick bldg. and quonset) with the sonar-equipped "Impulse" at the dock.

In northern Wisconsin, three field stations, staffed by graduate students and project associates are working on population dynamics, inter- and intra-specific competition of fishes and applied research on fertilization of barren lakes for productivity for fish. The discovery that hydrated lime and other chemicals render bog waters more transparent to the sun's rays by precipitating the brown colloidal pigments, now allows algae to grow in deeper water and enrich the low oxygen values. These bog water lakes, formerly sterile, can now support an active and productive trout fishery. These results came, of course, only after a long series of fundamental studies on light penetration of water, some of them dating back to early Wisconsin investigators.

The staff of the University of Wisconsin Hydrobiology Laboratory has introduced into limnology an experimental field procedure that consists of dividing a small lake, at a natural constriction, with an earthen barrier or dike that will give two units, one control and the other experimental, side by side. These small lakes, 2 to 15 acres in size, are ideal for "before and after" types of experiments and are manageable by a small research team. It is the belief of the author that all aspects of field hydrobiology are in need of small unit, micro-habitat situations where the experimental approach can be applied, and one factor at a time manipulated.

At the Hydrobiology Laboratory, situated as it is on the campus, research is integrated with the students' programs the year 'round. Cooperative intercollege administration is coupled with a long-standing tradition of interdepartmental collaboration. In recent years President E. B. Fred and Dean C. A. Elvehjem organized a Committee of Lakes and Streams, with Professor W. B. Sarles as coordinator. This organization now facilitates financial and academic cooperation across department and college lines.

Seldom has a well-conceived research project failed to receive support through such organizations as the University Research Committee which administers the funds of the Wisconsin Alumni Research Foundation, from private individuals, or foundations and national agencies such as the Office of Naval Research and the National Science Foundation. The Wisconsin Conservation Department, too, has decided to sponsor an enlarged series of studies on fundamental aspects of fish and aquatic habitat.

Thus opportunities for good research problems and progress in hydrobiology are on every hand at Wisconsin. One finds year-round summer station environment with good housing conditions and a wide selection of courses from all departments and colleges of the University of Wisconsin.

Hopkins Marine Station

L. R. BLINKS, *Director*

Aerial view of Hopkins Marine Station on a rocky promontory of Monterey Peninsula.

THE Hopkins Marine Station of Stanford University, at Pacific Grove, California, was the first marine laboratory on the Pacific Coast and is the third oldest in the country (Woods Hole and Cold Spring Harbor were established a few years earlier). It opened in 1882, the first summer of Stanford University itself, and is, therefore, the oldest biological station which is an integral part of an American university. It has remained closely tied to the biology departments of the campus, from which it is only about 90 miles distant.

The natural endowments of the laboratory are outstanding. The location was carefully chosen after inspection of available sites, and over 60 years of experience has justified the wisdom of the choice. The Monterey Peninsula, the most beautiful part of the California coast, supplies a land background of pine forests and granite headlands. To the south, mountains rise to two or three thousand feet elevation, with redwood groves in the coastal valleys. The private Seventeen Mile Drive and the state owned Point Lobos Reserve are nearby, both preserving the superb beauty of the coast at the two points where the wind-blow Monterey cypress is endemic.

The Coast itself varies from granite rocks, and tide pools filled with algae and invertebrates, to softer shale (penetrated by boring molluscs and worms), white sand beaches and salt marshes rich with mud-dwelling forms (including the remarkable worm, *Urechis*). Estuaries of rivers and creeks provide brackish and fresh water habitats, and offshore lie the giant kelp beds, the home of many animals (including the sea otter). Monterey Bay alone has records of over 900 species of molluscs: there are 50 species of chitons in the region. In the middle of the Bay is a deep submarine canyon, and water a mile deep is within four or five miles offshore. The latter is now visited weekly by the Station's research vessel *Tage*, which has been making a three-year survey of fluctuations of biological populations in deep water, and correlating these with physical and chemical changes in the sea water.

Originally emphasizing summer work in two wooden buildings donated by Timothy Hopkins, the Station entered year-round operations when it moved to new quarters in 1918, under the resident directorship of Walter K. Fisher. Ten years later, the Rockefeller Foundation donated and equipped a substantial new concrete building, designated the Jacques Loeb Laboratory, to commemorate the career and discoveries of this brilliant general physiologist, who conducted his early experiments with artificial parthenogenesis at a laboratory near the present buildings.

The two buildings have together about 60 rooms of which four are classrooms, the remainder offices and special laboratories.

Facilities and library, built up through the long life of the laboratory, are very good. Fifty journals are received. Most of the ordinary apparatus, glassware and chemicals are stocked, and many special instruments such as spectrophotometers, Geiger counters, monochromators, oscillographs, Warburg respirometers, etc. are available. There is an excellent running seawater supply, a cold and warm room, many refrigerated and controlled baths and incubators. Several small boats are available for inshore collecting, and a research vessel for offshore work. A truck aids field work and shore collecting.

Currently, the staff consists of Donald P. Abbott (invertebrate zoologist), Rolf L. Bolin (ichthyologist and ecologist), C. B. van Niel (microbiologist), and L. R. Blinks (physiologist). In addition, faculty members from Stanford University participate in the research and teaching of the station. Among such past members may be mentioned: Gilbert M. Smith (algologist), D. M. Whitaker (embryologist), C. V. Taylor (protozoologist),

Harold Heath (zoologist). Professors A. C. Giese and Graham du Shame from Stanford, and G. J. Hollenberg from Redlands University will teach courses in the summer of 1955. A. R. Moore (Professor Emeritus, University of Oregon) is in residence also.

Courses are open to Stanford and other students on equal terms, and credits are transferred to other universities. Those offered in 1955 will include: Ecology, Invertebrate Zoology, Embryology, Algology, Ichthyology, and Physiology (both animal and algal). These run for five weeks and two may be taken at the same time. Early application is advised, since some of the courses reach capacity and late applicants may be disappointed. For bulletin and application blanks, address the Acting Director at Pacific Grove.

Living quarters are available in nearby Pacific Grove, Monterey and Carmel. The secretary assembles a list of rooms, apartments and houses, and it is advisable for students to arrive a day or so before registration (June 27) to find quarters before classes start.

In addition to the classes, research toward advanced degrees is carried on by graduate students, of whom 10 or 12 are currently in residence through the year. Several post-doctoral fellows are usually present as well, making a scientific community of about 20 to 25 through the year—rising to 60 or more in the summer.

Know Your Associates

Eli Lilly and Company

Indianapolis, Indiana

Eli Lilly and Company was founded seventy-eight years ago. On May 10, 1876, Colonel Eli Lilly, a thirty-eight-year-old Civil War veteran, began operations as a "manufacturing pharmacist." The building where he installed his drug mills, percolators, and steam pans was—as he put it—"hardly big enough to swing a cat in." A small steam engine from the defunct White River steamboat *Little Eagle* provided the power for the plant's machinery and for a paint shop next door.

The Colonel's investment was $1,300 in that depression year. His staff consisted of two employees and his fifteen-year-old son, Josiah Kirby Lilly.

Today Eli Lilly and Company has grown into one of the world's largest pharmaceutical manufacturing houses. In Indianapolis alone, its two plants occupy fifty buildings with about 2,000,000 square feet of floor space. In addition, there are the Lilly Biological Laboratories and farm near Greenfield, twenty miles east of Indianapolis, and the Tippecanoe Laboratories near Lafayette, Indiana. Abroad, the company has manufacturing units at Toronto, Canada; Basingstoke, England, and São Paulo, Brazil. Lilly products, which make up a price list of more than 1,250 items, are sold in more than 120 countries. The sun, which always shines on the British Commonwealth, truly does not set on the red trademark of Eli Lilly and Company.

Research work in the Lilly laboratories dates from 1882, when J. K. Lilly was graduated from the Philadelphia College of Pharmacy and Science and returned to the Company. In his small laboratory he succeeded in establishing precise standards for the more important fluid extract tinctures manufactured by the company. In time, a chemist, a botanist, and a pharmacologist were added to the research staff. This phase of the work was expanding constantly. In 1886, J. K. Lilly set up the Lilly Scientific Division. He brought in as its director, E. G. Eberhardt, one of the first graduates of Purdue University's College of Pharmacy.

In 1911, the research staff received a building of its own. Within a decade it had outgrown it and was expanding into other buildings.

In the 1920's Lilly research men developed a series of important drugs—the sedative 'Amytal' (Amobarbital, Lilly), 'Para-Thor-Mone' (Parathyroid Extract, Lilly), the liver products for anemias, and an antiseptic, 'Merthiolate' (Thimerosal, Lilly). But the company's most important research achievement was the contribution of Lilly scientists towards the purification and mass production of Insulin, which was discovered by Dr. Frederick G. Banting, Charles H. Best, and their colleagues at the University of Toronto in 1921. Today, Iletin (Insulin, Lilly) is vital to the lives of nearly a million diabetics.

On October 11, 1934, Eli Lilly and Company dedicated a new building for its Research Laboratories. Since then, four additions have nearly tripled the original floor space, making a total of 175,000 square feet. Further building expansion is in progress now. The research facilities are considered among the finest in the world. Using them, Lilly scientists and medical men have produced a series of outstanding medicines.

The late 1930's were very productive. Insulin was improved by the addition of protamine and zinc. Notable in the long list of new products were 'Ergotrate Maleate' (Ergonovine Maleate, USP, Lilly) and another widely used barbiturate, 'Seconal' (Secobarbital, Lilly).

The revolutions in drug therapy resulting from the introduction of the sulfonamides and the antibiotics found Lilly research taking an important role. Latest contribution to the antibiotic field by the Lilly Research Laboratories is 'Ilotycin' (Erythromycin, Lilly), the broad-spectrum antibiotic which is noted for its virtual lack of side effects.

The years to come will find the more than 300 Lilly research workers dedicated as ever to the belief that the unfettered and seeking mind holds mankind's hopes for a better, more healthful and happier world.

Hoffmann-La Roche, Inc.

Nutley, New Jersey

Hoffmann-La Roche, Inc., associate member of the AIBS, develops, manufactures and markets prescription drugs and bulk vitamins. On the basis of new drug patents obtained during the past few years, Roche is the second leading pharmaceutical firm in the United States. The company was a pioneer in vitamin synthesis and is now one of the largest producers of bulk vitamins in the country.

Hoffmann-La Roche was founded in Basle, Switzerland, in 1896, and American operations began in New York City ten years later. As business expanded, the company moved repeatedly to larger quarters in New York, and ultimately to New Jersey. The Roche plant is now located on a one hundred acre tract of land in Nutley, New Jersey, about 12 miles west of New York City. Forty-two buildings house research laboratories, a reference library, and manufacturing and maintenance facilities. Approximately 2,200 people are presently employed at Hoffmann-La Roche, Inc.

The importance of chemical and pharmacological research has been consistently emphasized at Roche; research has undoubtedly contributed in measure to the rapid growth of the company.

More than 100 chemists and pharmacologists are engaged in full-time research to develop new drugs or to improve those already on the market. Each year, nearly 1,000 chemical compounds are synthesized in the continuing search for new and better drugs.

To be worthy of marketing, a new drug must not only be effective and safe, it must also represent an improvement over similar preparations currently in use. Most of the 1,000 compounds synthesized yearly do not survive animal screening tests for efficacy and lack of toxicity. Extensive clinical trials further reduce the number of drugs considered for marketing. In the end, one or two compounds out of the original thousand reach the druggists' shelves.

Second only in importance to research at Hoffmann-La Roche is quality control. No product can leave the plant without the approval of the product control laboratories. Random samples from each production lot of each product are subjected to no fewer than 10 and sometimes as many as 40 different tests for efficacy, stability, assay and safety. Unless samples measure up to rigid specifications, the entire production lot is discarded. Thus the physician is assured of consistently uniform quality and stability in the Hoffmann-La Roche products he prescribes.

Among important Roche products introduced to the medical profession during the past few years are Gantrisin, a highly soluble, single sulfonamide with a antibacterial spectrum; potent synthetic narcotics such as Levo-Dromoran and Nisentil; Thephorin, a nonsedative antihistomine; Roniacol and Ilidar, vasodilating agents; Asterol, an antifungal agent, synthetic vitamin A; synthetic ascorbic acid; synthetic vitamin B_1 and other B factors widely used for vitamin therapy and food enrichment.

The Upjohn Company

Kalamazoo, Michigan

The Upjohn Company is a Michigan corporation engaged in the manufacture of pharmaceuticals. Since the Company's beginning in 1886, its objective has been to serve the medical and pharmaceutical professions. This service embodies the manufacture of the finest pharmaceuticals which can be devised by a large and competent research department. It includes the distribution of product information and medical progress reports to these professions by a well-trained sales organization.

The business was inaugurated for the purpose of manufacturing better pills, the most prevalent form of medication at the time. These pills were prepared by a revolutionary process developed by the founder, Dr. W. E. Upjohn, at that time a practicing physician. He was joined in the enterprise by three brothers, two of whom had medical training and one who had training in pharmacy. With the decline of pills as a popular form of medication, the Company started to manufacture a general line of pharmaceuticals and specialty products—a practice still followed.

The Upjohn Company was a pioneer in the development of medicinal cod liver oil and effervescent salts, and has long been a leader in the fields of vitamin and nutritional products. Research and development of antibiotics and hormones have also played a major part in Company growth.

Keeping pace with rapid expansion has meant the addition of new buildings and equipment. The most recent step in providing modern facilities is the large new plant located about four miles from the Kalamazoo city limits. This project houses all of the production operations, thus permitting expansion of research at the downtown location. The recently remodelled research facilities include a fourteen-story and basement building with 134,500 square feet of floor space, a five-story and basement building with 25,600 square feet of floor space at the location in downtown Kalamazoo, with additional facilities for pilot laboratories at two other locations.

The growth of the business has resulted in a steady increase in the number of employees. This number now approximates 4300, with 2750 in Kalamazoo, including 450 in research. The rest are in sales and branch offices located in fourteen other cities in the United States. The steadily growing export operation includes Upjohn of Canada and Upjohn of England.

All of these factors—farsighted research, modern production facilities, quality products, intelligent selling and loyal employees have combined to make The Upjohn Company a leading manufacturer of pharmaceuticals.

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